

EUREKA COUNTY YUCCA MOUNTAIN IMPACT REPORT

The report in this appendix may contain references to potential mitigation or compensation related to the impacts that are identified. *It is the State of Nevada's firmly held position that no amount of mitigation or compensation will make Yucca Mountain or the related transportation of spent fuel and high-level radioactive waste acceptable to the State, and that Nevada is not seeking and will not negotiate for any type or amount of mitigation or compensation.* Any discussion of mitigation or compensation contained in individual AULG reports is extraneous to the purpose of the State Yucca Mountain Impact Report, which is intended solely to present a comprehensive portrayal of the range of impacts associated with the federal repository program.

The magnitude of impacts statewide and the nature of those impacts lead to but one conclusion: *The only way to protect Nevada – and the nation – from the massive, negative effects of this program is to abandon the Yucca Mountain project altogether, something Nevada contends should have occurred years ago.*

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PREFACE

At 9:30 p.m. on August 12, 1939, the Southern Pacific Railroad's streamliner, *The City of San Francisco*, derailed in the Palisade Canyon in Eureka County, near Harney, 16 miles west of Carlin, killing 24 people and injuring 121. The SPRR said that a saboteur moved a rail, while others blamed the accident on unsafe speed. The accident was officially ruled a sabotage (DeNevi, 1977; Foote, 1989; Henderson, 1995).

The train had departed from Chicago on August 11, and had traveled through Council Bluffs, IA, and Ogden, UT, on its way to San Francisco (Foote, 1989). At a length of about one-quarter mile, a weight of 1.2 million pounds, pulled by six engines generating 5,400 horsepower, with air brakes and a low center of gravity, and costing over \$2 million, *The City of San Francisco* "symbolized the ultimate in safety engineering." Owned jointly by the SPRR, the Union Pacific Railroad, and the Chicago-Northwestern Railroad, it carried 220 people, including the crew (DeNevi, 1977; Hickson, 1980).

Hickson (1980) reports that the engineer "felt the big unit lurch, then jump the tracks, out of control. Crossing the bridge, the power sections and two cars traveled about nine hundred feet before grinding to a stop. Five cars dropped into the Humboldt River and three more went off the tracks and down an embankment. Only four units remained upright on the tracks."

According to Foote's eyewitness account (1989), the coffee shop car in which he was riding jumped the tracks and tore down a steel truss bridge, and the rest of the train broke apart. Foote was thrown entirely free of the train and was seriously injured.

As the story of *The City of San Francisco* shows, even the best-engineered systems are subject to failure, and vulnerable to human error and sabotage. Other serious accidents have occurred on our nation's transportation systems, even as this report was being prepared, including a train wreck near Battle Mountain, Nevada, and an incident in a tunnel in downtown Baltimore. The latter example was accompanied by three elements that could create a worst-case nuclear transportation accident--fire, water, and mechanical force.

The proposed action of the U.S. Department of Energy involves a profound element of risk, which the Congress and the President may impose upon the land and people of Eureka County. It would have numerous impacts--some of them beneficial, others not. This impact assessment report attempts to begin to describe the risk and the impacts, for discussion and deliberation by all affected persons.

Part 1:

INTRODUCTION

In accordance with the federal Nuclear Waste Policy Act, and in response to the request of Nevada's Agency for Nuclear Projects, the Board of Eureka County Commissioners directed the preparation of this impact assessment report. The report discusses the anticipated impacts on Eureka County from the U.S. Department of Energy (DOE) proposal to transport spent nuclear fuel and high-level radioactive waste through Eureka County to a geologic repository at Yucca Mountain.

On January 20, 2000, Eureka County submitted written comments to the DOE on the draft environmental impact statement (DEIS) for the proposed repository (USDOE, 1999a), including its transportation components. The County said, and continues to believe, that the DEIS is insufficient for decision-making related to the proposed action. This impact assessment report does not take the place of a complete environmental review by the DOE. Within the constraints of available resources and incomplete information regarding the project, it is simply a preliminary survey of anticipated effects and possible needs for mitigation.

This report consists of six parts: introduction, description of the proposed action, affected environment, anticipated impacts, mitigation of anticipated impacts, and information on preparation of the report itself. A list of references is also included. Further, Eureka County encourages readers to consult the following list of reports and other resources (some of which are available on the Internet at www.yuccamountain.org) for additional background information:

- Eureka County (1993). *Eureka memories: oral history project*.
- Eureka County (1994). *Emergency management existing conditions and needs*.
- Eureka County (1995). *Emergency response case studies*.
- Eureka County (2000). *Comments on draft environmental impact statement for a geologic repository for the disposal of spent nuclear fuel and high-level radioactive waste at Yucca Mountain, Nye County, Nevada (U.S. Department of Energy, July 1999)*.
- Eureka County and Lander County (1995). *Atmospheric pathways report*.
- Planning Information Corporation (1993). *Issues identification report for the Carlin rail route option*. Prepared for the Board of Eureka County Commissioners.

The reader should direct any comments or questions on this report to Abigail C. Johnson, c/o Yucca Mountain Information Office, Eureka County, P.O. Box 714, Eureka, NV 89316 (775/237-5372).

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Part 2:

DESCRIPTION OF PROPOSED ACTION

Transportation scenarios

Scenarios generally. For the transportation of spent nuclear fuel (SNF) and high-level radioactive waste (HLW) to the proposed geologic repository at Yucca Mountain, the United States Department of Energy (DOE) has identified five potential rail corridors, five potential heavy-haul truck routes, and three potential intermodal transfer locations in Nevada. The DOE has also identified three basic transportation scenarios: mostly rail, mostly legal-weight truck, and heavy-haul truck (USDOE, 1999a).

Actual transportation modal mix. The DOE has not yet said what the actual modal mix would be for shipments of SNF and HLW to the proposed repository. The actual mix would probably involve different truck/rail splits than described in the three DOE scenarios, and could involve different sizes of rail and truck casks (USDOE 1999a). The Nevada Agency for Nuclear Projects believes that the most probable modal mix, if a new rail spur were constructed and operated, is 26,400 truck shipments and 14,100 rail shipments over 38 years. If no new rail spur were constructed, there would be 96,000 truck shipments (Halstead 2001). Note, however, that all scenarios require either rail or heavy-haul access to the proposed repository, for naval SNF shipments if not others. At the present time, there is no rail access to the proposed repository (USDOE, 1999a).

Rail transportation would have the highest construction cost and is the basis for the DOE's reference program design. Full-scale heavy-haul truck transportation would involve lower construction costs than rail transportation, but higher operations and maintenance costs. Total life-cycle costs would be about the same (Bechtel SAIC, 2001).

Mostly rail scenario. The mostly-rail scenario involves construction of a spur rail line to Yucca Mountain, which would handle most of the shipments of SNF and HLW. About 20 percent of commercial SNF shipments would, however, take place by legal-weight truck. There would be 450 annual rail shipments on the spur line, plus 110 annual truck shipments. Over a possible 38-year period of shipments and disposal, there would be about 20,000 total rail shipments, plus 3,700 truck shipments from commercial reactor sites that cannot load rail cars (USDOE, 1999a).

Mostly legal-weight truck scenario. In this scenario, most shipments of SNF and HLW would travel directly to the proposed repository by legal-weight truck. Federal regulations require the use of preferred routes, including the interstate system, beltways, and bypasses. The proposed truck routes in Nevada would include I-15 and US 95. The DOE assumes that a complete beltway around the Las Vegas metropolitan area will be operational by 2010.

States and tribes may designate alternate routes, also in accordance with federal regulations, after considering public risk, consulting with local governments, and consulting with other affected states (USDOE 1999a). Alternate truck routes considered to date by Nevada's Department of Transportation do not pass through Eureka County, but would carry SNF and HLW entering Nevada from the east through Elko County and White Pine County toward Yucca Mountain (Halstead, 2001). However, since *all* scenarios involve some transport by legal-weight truck, since no specific alternate route has yet been designated, and since weather or other operational variables could force the use of other additional routes, I-80, U.S. 50, and Nevada 278 in Eureka County could be used periodically or regularly to transport SNF and HLW to Yucca Mountain.

The mostly legal-weight truck scenario includes some overweight, over-dimensional (but not heavy-haul) truck shipments with a gross vehicle weight of 40 to 57.5 tons and some rail shipments. There would be 2,100 average annual truck shipments, plus 13 annual rail shipments of naval SNF from Idaho to Nevada, which would proceed to the proposed repository by heavy-haul truck. (USDOE, 1999a)

Heavy-haul truck scenario. This scenario involves the construction in Nevada of highway improvements and an intermodal station for the transfer of rail casks to heavy-haul trucks, and for the transfer of empty rail casks from heavy-haul trucks back to rail cars. All of the sites and routes the DOE has identified are in Clark, Nye, Lincoln, and Esmeralda Counties. (USDOE, 1999a)

According to the Bechtel SAIC report (2001), difficulties in obtaining permits from Nevada's Department of Transportation for each heavy-haul truck shipment could significantly limit the rate of waste shipment by this mode. The report says the use of heavy-haul trucks on public highways could, therefore, be untenable for the proposed rate of shipments. "Scenarios that include this alternative are assumed to incur uncertainties in acceptance by the public and regulatory agencies in addition to those associated with the mostly rail alternative," the report says.

Carlin rail corridor, specifically. One of the five potential rail corridors the DOE has identified for transporting SNF and HLW to the proposed repository is the Carlin route, which passes through Eureka County. (See the corridor map, Figure 1.) The entire route is 317 miles (520 km) in length, and the DOE has classified the route as 100 percent rural. The Carlin rail corridor originates at the Union Pacific tracks near Beowawe, and converges with another potential corridor, the Caliente corridor, south of Tonopah (USDOE, 1999a). The corridor passes through the Crescent Valley, Grass Valley, and Big Smokey Valley. It crosses U.S. 50 east of the town of Austin, crosses U.S. 95 between Tonopah and Goldfield, and generally follows U.S. 95 and the western boundary of the Nellis Air Force range to Yucca Mountain (Halstead, 2001). The DOE has identified 10 possible alignment variations for the corridor, including a variation in Crescent Valley near the Cortez mine (USDOE, 1999a). As discussed later, the DOE may share the use of the rail corridor with mines and other users.

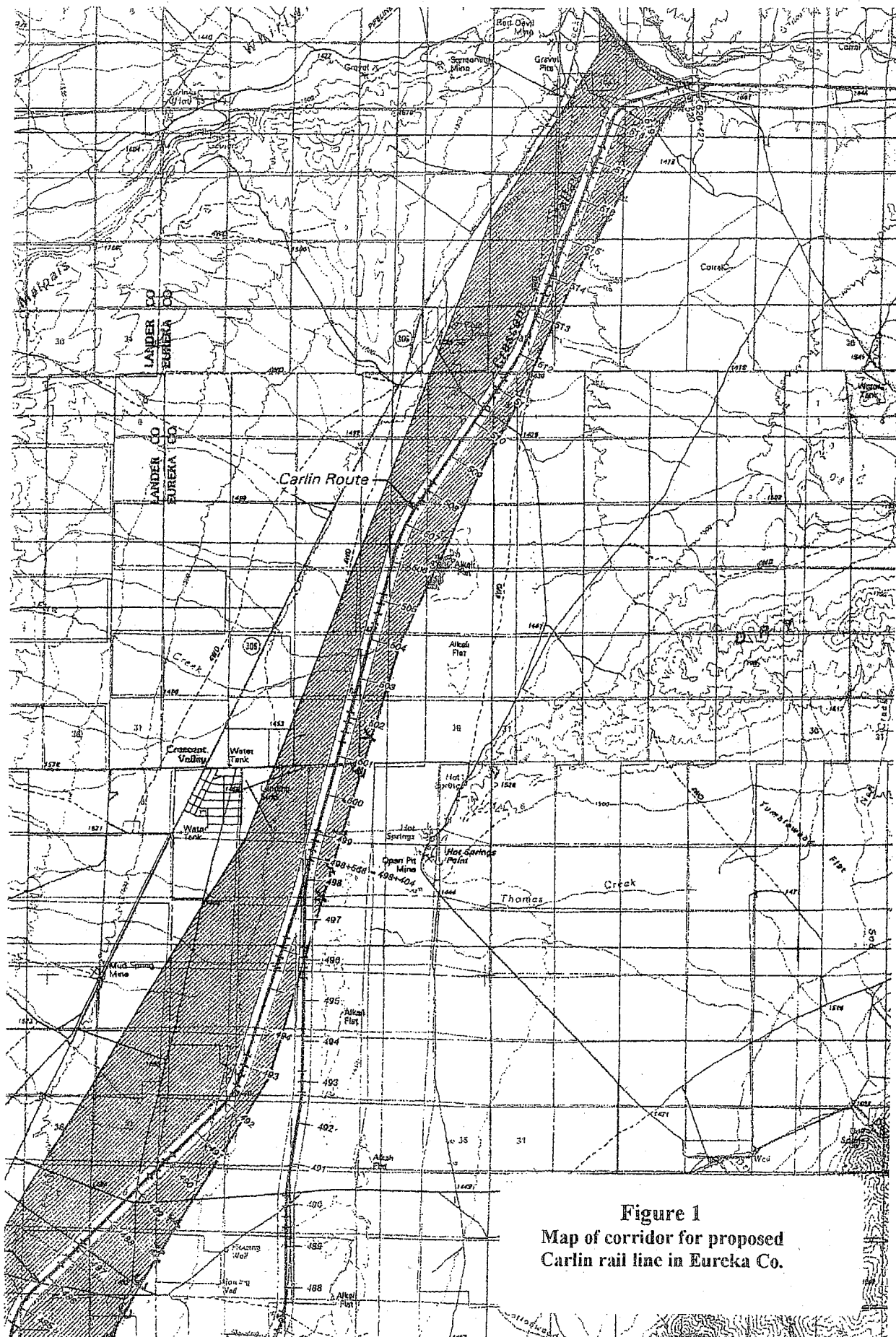
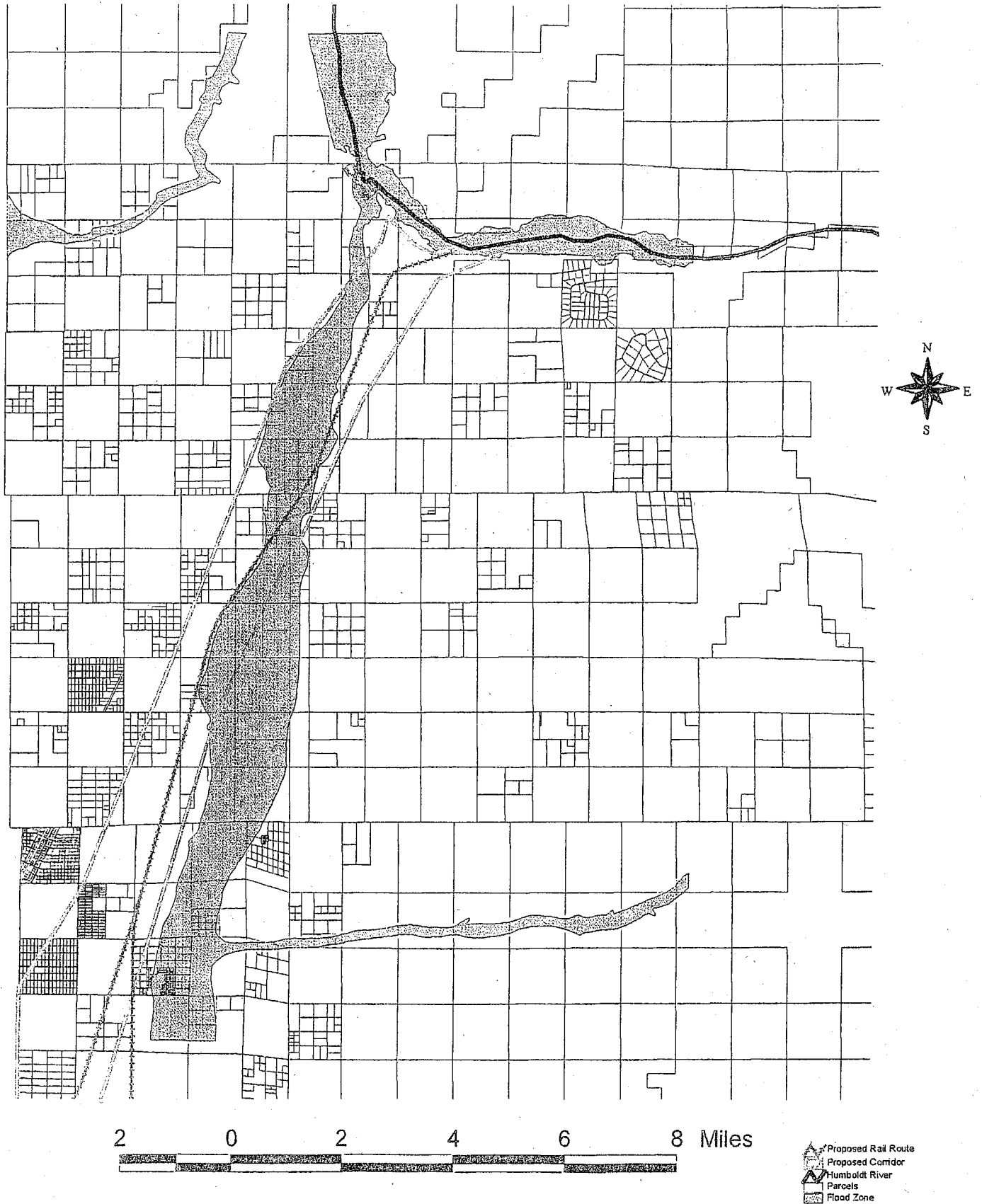


Figure 1
Map of corridor for proposed
Carlin rail line in Eureka Co.

Figure 2

FLOOD ZONE ANALYSIS - EUREKA COUNTY, NEVADA



Corridor maps prepared by DOE contractors designate the 13-mile (22-km) portion of the corridor from Beowawe to the divergence of the Crescent Valley alternative as Segment 5M, and the 15-mile (24.2-km) portion between the start and end of the Crescent Valley alternative as Segment 5L (Moore, 2001a).

The proposed Carlin corridor crosses the area of the 100-year flood (as mapped by the Federal Emergency Management Agency in 1998, see Figure 2), or runs immediately adjacent to that area, for at least eight miles between Beowawe and the Town of Crescent Valley. The proposed location of the connections to the UPRR tracks at Beowawe may or may not be in the area of the 100-year flood, but portions of the existing tracks along the Humboldt River are.

The estimated cost of constructing the Carlin route is about \$1 billion; the estimated cost of the portion within Eureka County is \$50 to \$60 million. These estimates include the roadbed and track only. The estimated cost breakdown for the portion within Eureka County is: labor (16 percent), material (51 percent), equipment (14 percent), and right-of-way acquisition, engineering, and miscellaneous (20 percent) (Moore, 2001a).

Proposed schedule

If the shipments of SNF and HLW include the so-called Modules 1 or 2 described in the DEIS for the proposed repository, there would be at least 38 years of shipments, ending in the year 2047. (For purposes of this impact assessment report, Eureka County has selected 38 years as the minimum time period for analysis.) The DOE's Office of Civilian Radioactive Waste Management would identify the preliminary route approximately four years before shipments begin. After route selection, engineering studies, design, land acquisition, and installation of wells along the route, the DOE says actual construction would take about 2.5 years (USDOE, 1999a). However, the State of Nevada believes that construction could require five to seven years, and that environmental reviews and approvals, land acquisition, and consideration of Native American rights could delay construction an additional five to ten years (Halstead, 2001).

Construction of the proposed repository facilities for handling SNF and HLW would begin after receipt of construction authorization from the Nuclear Regulatory Commission (NRC). The DOE assumes that construction will begin in 2005, and that the initial construction phase will last five years, from 2005 to 2010 (USDOE, 1999a). Repository operations would begin after the DOE receives a license from the NRC. Although the DOE has recently discussed an accelerated schedule, the DEIS assumes receipt and emplacement of SNF and HLW will begin in 2010.

At the end of the period during which the DOE transports SNF and HLW, the DOE would remove the transportation facilities or use them for other purposes. The DOE assumes that closure of the proposed repository (as opposed to the open, monitored condition) will begin 100 years after the start of emplacement, but considers a range of 50 to 300 years. Repository closure would take six to 15 years (USDOE, 1999a).

Packaging and vehicles

Legal-weight trucks. Legal-weight trucks used to transport SNF and HLW to the proposed repository would weigh 25 tons (22,750 kg) when loaded. A legal-weight truck is defined as one with a gross vehicle weight of less than 40 tons (36,400 kg), which is the loaded weight limit for commercial vehicles operated on public highways without special state permits. The dimensions, axle spacing, and axle loads would comply with federal and state requirements (USDOE, 1999a). The DOE has provided a drawing of a legal-weight truck in the DEIS at page 2-39. The drawing depicts a shipping cask, 20 to 23 feet in length, on a tractor/trailer combination about 70 feet long.

Heavy-haul trucks. Heavy-haul trucks used to transport SNF and HLW would be overweight, over-dimension vehicles, which must have state permits to use public highways. They would move SNF and HLW shipping casks designed for transport by rail car (USDOE, 1999a).

Rail cars. The DOE has provided a drawing of a rail car that would be used to transport SNF and HLW, at page 2-39 of the DEIS (1999a). The drawing depicts a rail cask, 20 to 23 feet in length, on a rail car of 60 feet.

Shipping containers. The large shipping containers that would be loaded on rail cars, legal-weight trucks, and heavy-haul trucks are called "casks." Smaller containers loaded inside the casks are called "canisters." There are numerous possible shipping cask configurations. A rail cask could contain: (1) six to twelve metric tons of heavy metal (MTHM) of commercial SNF, in the form of up to 36 SNF assemblies, (2) five canisters of HLW, (3) four to nine canisters of DOE SNF, except naval SNF, or (4) disposable canisters of naval SNF. Each legal-weight truck cask could contain: (1) 1.8 MTHM of commercial SNF, in the form of up to four SNF assemblies or (2) one canister of DOE SNF (except naval SNF) or HLW. Naval SNF would not be shipped by legal-weight truck (USDOE, 1999a).

Disposal containers. The containers that DOE would use to emplace SNF and HLW underground at the proposed repository weigh 36 tons (33,000 kg), with a $\frac{3}{4}$ -ton (700-kg) lid. They would be delivered to the proposed repository by rail (7,900 deliveries in 38 years), with SNF and HLW or on separate supply trains. Or, if rail service is not available, the disposal containers would be shipped on overweight trucks, in 15,800 separate shipments (USDOE, 1999a).

Rail spur construction

Corridor and site. To implement the Nevada rail scenario, DOE would obtain a corridor right-of-way 1300 feet (400 meters) wide to construct a rail line and access road. According to the DOE, the actual construction width would be about 200 feet (60 meters). Less than 15 percent of the land in the corridor would be disturbed, as well as less than a square mile outside the corridor, which would be disturbed for roads, camps, and other purposes. Vegetation would be cleared from the 200-foot construction corridor and from well sites, borrow areas, and construction camps, and buried in disposal areas for excavated materials (USDOE 1999a).

The exact location and alignment of the branch rail line would be determined after consideration of: (1) the minimum impact to flood plains, wetlands, private land, capital improvements, areas containing cultural resources, and other environmentally sensitive areas, (2) the minimum size and number of easements, (3) consultation with persons controlling the land regarding the location of staging areas and construction camps, and (4) the need to reclaim disturbed lands outside the right-of-way after construction (USDOE 1999a).

The total length of the Carlin rail corridor in Eureka County (from the vicinity of Beowawe to the vicinity of the town of Crescent Valley) is about 18.25 miles. The DOE proposes two wye (or "Y") turnouts for connection to the existing eastbound and westbound UP tracks, one to two miles east of Beowawe in section 9, T31N, R49E. Wye turnouts from both sets of tracks would allow eastbound and westbound trains access to the Carlin rail spur without having to back trains. The DOE selected Beowawe because there is sufficient room to construct the wye connections. Either a grade-separated or at-grade crossover of the existing southern tracks would be required (Moore, 2001a).

Additional terminal facilities would be constructed at the location of the wye, east of Beowawe. These facilities would require a significant land area, the size and location of which are not yet specified. They would probably include: interchange tracks; turning tracks; emergency material storage tracks (i.e., rail cars loaded with ballast, rail panels, and other supplies), chain link fencing, a HiRail pad, an emergency station, garage and storage building, crew station and office, and locomotive service facility (Moore, 2001b). The facilities could also include an operations center; maintenance headquarters; automotive vehicle maintenance facility; dormitory; fueling station; and rail car repair shop (Moore, 2001a).

The DOE plans one grade-separated road crossing in Eureka County, for the intersection of the proposed rail line with the Dean/Dann/Spa Road, County Road M-115. The grade separation would be just east of the Town of Crescent Valley. The DOE also plans one signaled at-grade road crossing at an unspecified location; the remaining crossings would be unsignaled, at grade (Moore, 2001b).

Design. Design criteria for the Carlin rail spur include a requirement that the 100-year flood would not inundate the rails at channels fed by sizable drainage areas. The rail line would be designed and built in accordance with Federal Railroad Administration (FRA) safety standards (USDOE, 1999a).

The maximum preferred grade would be 1.5 percent, based on the requirements for moving high axle-load cars downgrade. If 1.5 percent is not feasible, the maximum grade would be 2.2 percent, and less than 2.5 percent at all locations. (See proposed rail line profile, Figure 3.) The maximum allowable curvature would be 8 degrees. Where feasible, the curvature would be less than or equal to 2 degrees. Moore says that the minimum right-of-way width is 200 feet (100 feet on each side of the centerline), and wider in cut/fill areas. The right-of-way would be fenced if fencing is required by the landowner or land management agency (Moore, 2001a).

Typical cross sections for a railroad bed are shown in Figure 4. The actual width would be dependant on the terrain. For a typical fill cross section, the width of the area covered by fill

would be approximately 50 feet. The width of cut cross sections would vary, but would probably average about 100 feet. An access road will parallel the tracks for service and maintenance (Moore, 2001a).

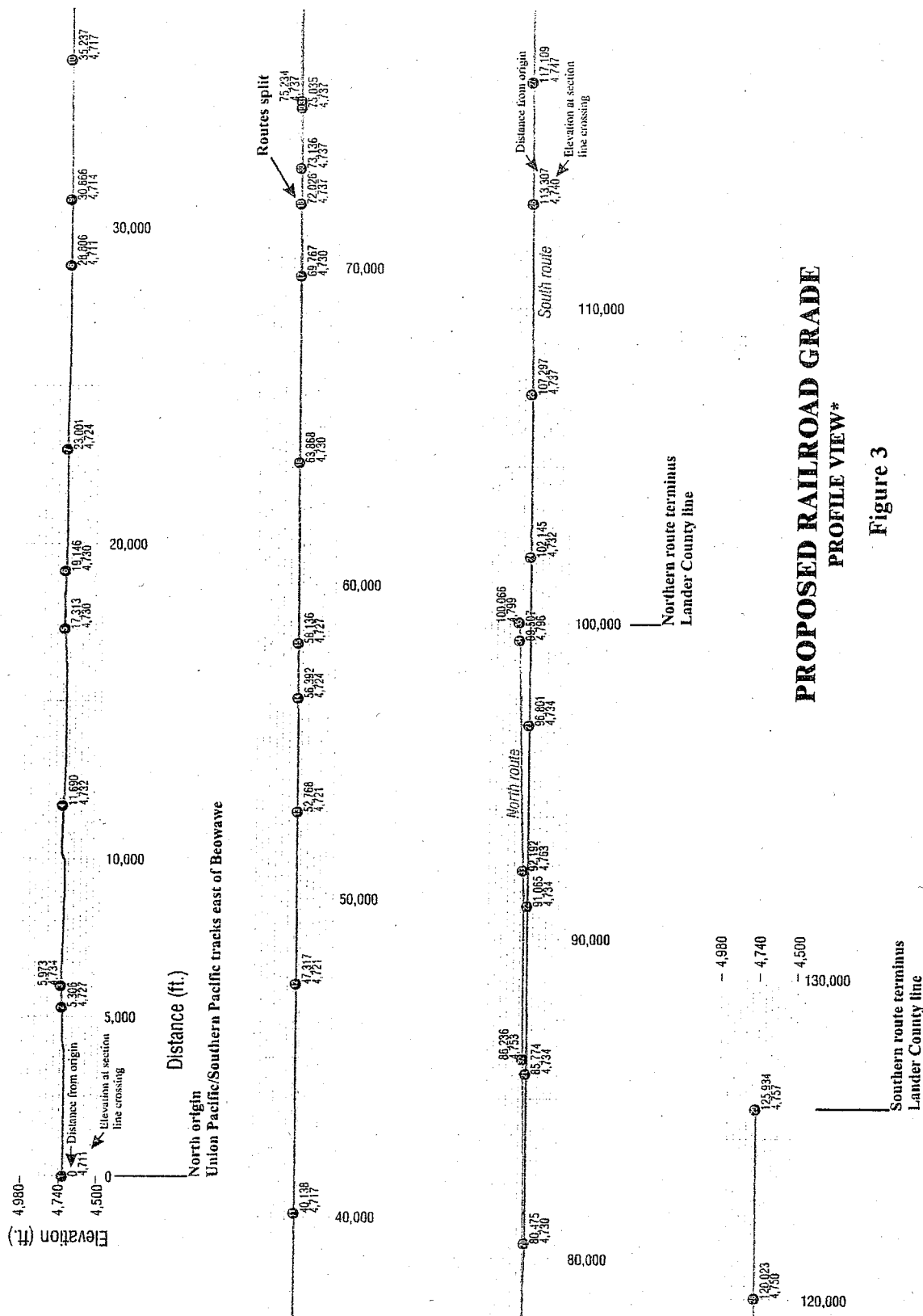
Track would be 115-pound continuous welded rail. Ties would be either timber or preformed concrete ties (Moore, 2001a).

Actual construction. The overall construction sequence for the Carlin rail spur would consist of: (1) development of support areas and access roads, (2) construction of major structures, (3) construction of the rail bed, simultaneously at multiple locations, (4) installation of culverts and underpasses, if any, (5) replacement of topsoil and installation of silt controls, (6) laying ties and rails on the subgrade, (7) placement of ballast with special rail-mounted equipment, and (8) installation of signal and communications systems. Engineering, design, and land acquisition would precede this construction sequence (Moore, 2001a) as would development of water wells along the corridor. Construction camps would be closed after construction is finished in an area (USDOE, 1999a).

The DOE has not identified the numbers of support areas and rail bed construction initiation points. Their numbers and locations would depend on the final route; the length of the route; the schedule; the number of major structures; and the location of existing roads. The DOE estimates that five construction camps would be placed at about equal distances to provide construction support and temporary housing. (Note that five equally spaced camps in a 317-mile distance means that camps would be about 60 miles apart.) The proposed location for one construction camp is located in Lander County, just east of the Lander-Eureka county line. However, such a camp could be moved to Eureka County, closer to developed areas. Materials and equipment would be delivered to initiation points and work camps by truck (Moore, 2001a, 2001b; USDOE, 1999a).

A project of this size would require significant lay-down areas to store construction materials. Since much material would probably be delivered by train, the logical location for one lay-down area is near Beowawe (Moore, 2001b).

Rail bed construction would use conventional earth-moving equipment: bulldozers, scrapers, and dump trucks. After vegetation is cleared, topsoil would be removed and stockpiled. A temporary access road would probably be built along and within the right-of-way (Moore, 2001a) and a permanent service road would be built and maintained along the rail line (USDOE, 1999a). The subgrade would be a stable, raised bed about 28 feet wide, composed of gravel and soils. Subgrade material would be placed and compacted, and water would be applied to achieve dust control and compaction. Sub-ballast material (granular and well-graded, similar to highway base) would then be placed and compacted to a depth of 6 to 12 inches. The DOE has not identified the source of the sub-ballast; it is usually obtained from local gravel pits (Moore, 2001a).



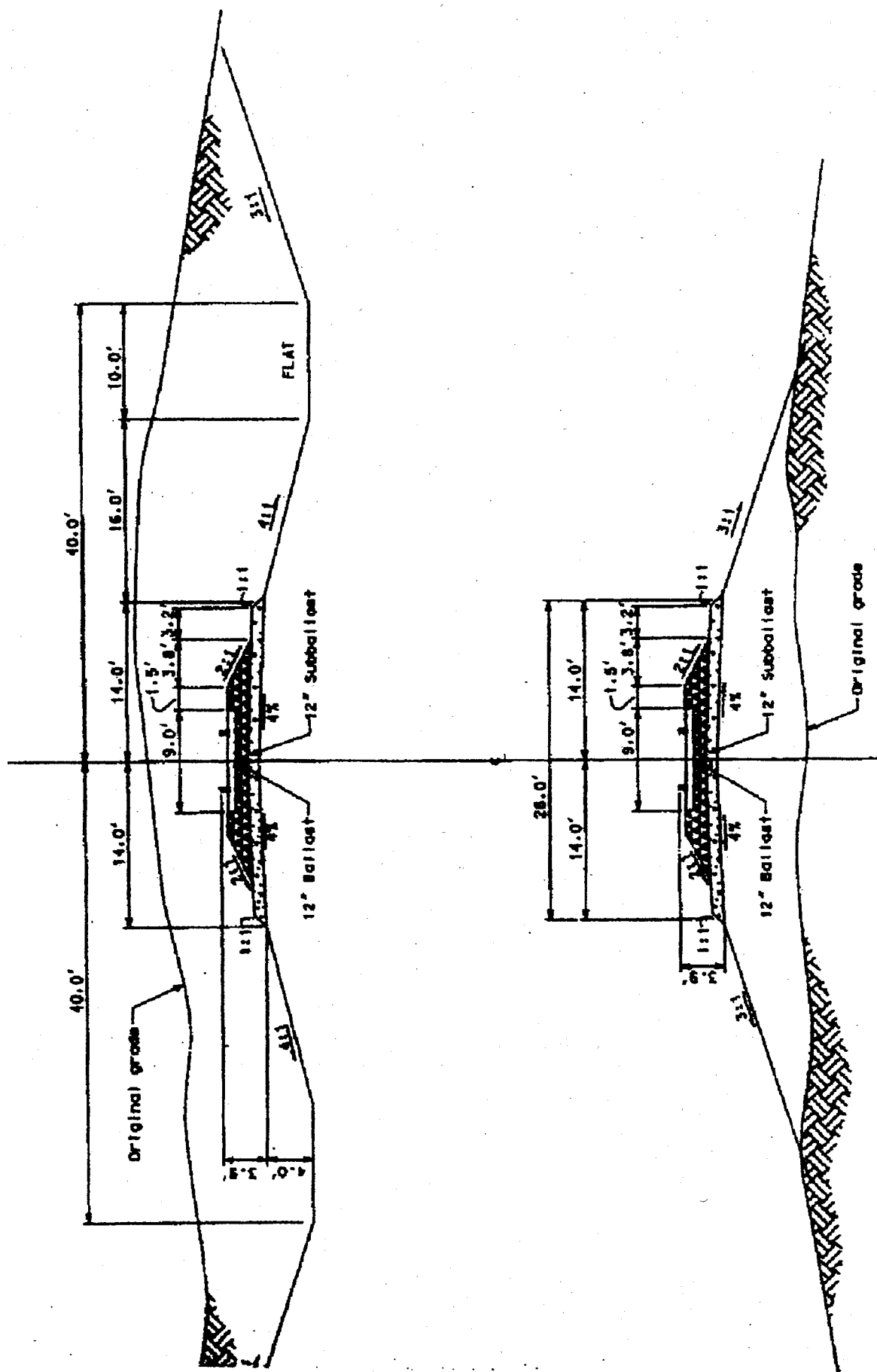


Figure 4
Typical cross sections,
proposed railroad bed

After support areas and access roads are in place, bridges across major drainages and highway grade separations would be constructed. These activities involve placement of pre-cast concrete structures, following site preparation and pouring of footings. The DOE has not specified the location of the pre-cast plant and staging yard (Moore, 2001a).

During and after construction of the rail bed, local road underpasses, livestock underpasses, and culverts would be installed. Local road underpasses are typically 14-foot square box culverts; livestock underpasses are usually eight-foot diameter steel culverts (Moore, 2001a). At-grade crossings would also be installed and existing utility lines would be rerouted as required (USDOE, 1999a).

During construction, trucks would spray water on graded areas for dust control and soil compaction. Water would be shipped from other locations or obtained from wells along the route. The DOE says the Carlin route would require 660 acre-feet (28.7 million cubic feet) of water from 67 wells, that groundwater withdrawals during construction would require temporary permits from the State of Nevada, and that the DOE may lease temporary water rights along the corridor. If groundwater cannot be withdrawn along the route, it would be transported to construction sites by truck (USDOE, 1999a). Note that the water would be delivered by truck in any event; the variable is the distance the truck must travel from the water source. Note also that the DOE's estimates of the amount of water required do not include water for making concrete poured on site.

The next construction step would be placing ties and continuous welded rail on top of the subgrade. The rail would be produced at a facility near existing rail lines, in Nevada or elsewhere. Crews would distribute ties along the rail bed by truck and deliver rail sections on special rail cars. Beginning at the wye connection to the main rail lines, rail sections would be placed, welded, and fastened to the ties. Trains traveling on newly laid sections of track would deliver the next rail sections (Moore, 2001a).

Once the continuous rail is placed and fastened, crews would deliver ballast in bottom-dump rail cars and put it in place using specially designed rail-mounted equipment. Ballast would be compacted in place to a minimum depth of 8 to 12 inches, using tamping equipment, and additional ballast would be placed on curves (Moore, 2001a).

After the rail bed is complete, final grading of slopes would take place, rock-fall protection devices would be installed, and topsoil would be replaced on disturbed areas, which would be seeded and mulched. Silt fences, plastic netting, and other erosion control devices would be installed. Signals, monitoring equipment, and communications equipment would be installed. The DOE (1999a) says that fences would be installed along the rail line if requested by such agencies as the BLM and the U.S. Forest Service; however, preliminary construction cost estimates include fencing for the entire right-of-way. The adjacent service road would also be completed (Moore, 2001a, 2001b; USDOE, 1999a).

Cuts and Fills. Construction of the Carlin branch line would require significant cuts and fills to maintain required grades, as determined by terrain. Crews would use scrapers, bulldozers, power shovels, drag lines, front-end loaders, belly dump trucks, and blasting as required. Material from

cuts would be used as fill to the maximum extent possible (Moore, 2001a). But due to haul distances, the need for additional fill, or the composition of cut material, excavated material may be disposed of in low areas, borrow areas may be established, and access roads may be constructed to connect the rail line construction with borrow areas and disposal sites (USDOE, 1999a). Additional right-of-way may be required (Moore, 2001a) or borrow and spoil areas may be established outside the corridor (USDOE, 1999a).

Drainage and Protection of Surface Water. Construction of the branch rail line would require alterations to many natural drainage areas. Bridges and culverts would be used, as necessary, to cross streams, creeks, and washes of any size, in order to accommodate the 100-year flood in channels. Construction would also include regrading to route minor drainages to single channels (USDOE, 1999a).

During construction, impacts on surface water would be avoided by management practices designed to prevent and mitigate pollutant spills. Construction would include the following surface water measures: (1) minimizing disturbance of surface area and vegetation, (2) designing facilities to withstand or accommodate the 100-year flood, (3) avoiding spills in unconfined areas and areas subject to flash floods, (4) maintaining natural contours to the maximum extent feasible, (5) minimizing physical changes to drainage channels, (6) using erosion control at bridges and culverts, (7) using physical controls, such as secondary containment, for fuel storage tanks, (8) following DOE reclamation guidelines in and around flood plains, (9) training employees regarding the handling, storage, distribution, and use of hazardous materials, (10) conducting fueling and storing hazardous materials in bermed areas away from flood plains, and (11) providing rapid response cleanup and remediation capability, techniques, procedures, and training for spills (USDOE, 1999a).

Materials. During the construction phase, the DOE says the construction of the Carlin branch rail line would require 10 million gallons of diesel fuel, 210,000 gallons of gasoline, 79,000 tons of steel, and 440,000 tons of concrete. The DOE would use pre-cast concrete for rail ties, culverts, bridge beams, and overpass components, and would pour up to 130,000 tons of concrete on site. Vehicles delivering materials would travel 12 million miles, and commuting workers' vehicles would travel 46 million miles. Portable generators would provide electricity needed for construction. Fuels, lubricants, antifreeze, and coolants would be stored at work camps (USDOE, 1999a).

Construction of the rail line in any right-of-way selected will require significant quantities of subballast. The segment through the Crescent Valley would require 155,000 cubic yards of subballast, the source of which is not known (Moore, 2001b).

Rail construction would generate solid waste in the form of scrap rails, ties, bridge timber, and track fastenings, much of which would be salvaged as scrap (Moore, 2001a). The DOE would: dispose of nonhazardous industrial wastes in permitted industrial landfills; dispose of construction debris in permitted construction debris landfills; dispose of hazardous waste at permitted hazardous waste treatment and disposal facilities; and dispose of sanitary waste by commercial vendor (USDOE, 1999a).

Workers. The DOE says that construction of the branch rail line would require an annual average of 500 workers. Peak direct plus indirect employment would be 1,100 persons (USDOE, 1999a). The DEIS (USDOE, 1999a) does not discuss hiring practices, but existing Eureka County residents might make up a small portion of the construction force. Variables that would affect overall construction employment include: the number of shifts worked; the number of major bridges and other structures; and the type and location of such other facilities as shops (Moore, 2001a). Construction would occur primarily during daylight hours, unless there is a need for accelerated construction to meet schedules (USDOE, 1999a).

Based on experience at other similar projects, each major bridge site would require about 50 workers, and each road bed construction crew would consist of about 50 workers. (There would be five such crews working simultaneously.) Construction of support facilities at the wye connections to the main lines would require a significant number of workers, and about 50 workers can be expected at the overpass structures at the wye. Significant numbers of workers would be required to construct a headquarters, staging areas, operations center, locomotive shop, maintenance headquarters, automotive vehicle maintenance facility, emergency station, dormitory, fueling station, rail car repair shop, and storage tracks in the Beowawe vicinity. Construction maintenance workers would also be required (Moore, 2001a).

Assuming a 500-person construction crew, manpower requirements by trade would break down in this way: operating engineers (124), carpenters (27), mechanics (11), laborers (127), truck drivers (35), iron workers (16), locomotive engineers (3), trainmen (5), signalmen (5), supervisors (52), technicians (14), field engineers (14), and machine operators (67) (Moore, 2001a).

Rail spur operations

Operations generally. The DOE would own the branch rail line, which could be operated by a contract operator. The carrier would be either a private carrier or common carrier. If a contract operator were used, the operator would be responsible for hiring and for maintaining the track and road bed. The rail cars would be owned by the DOE and maintained by the DOE or the contract operator. The locomotives would be owned by the DOE or the contract operator (Moore, 2001a). The DOE says that buffer and escort cars would accompany SNF and HLW shipments (USDOE, 1999a).

The DOE would use TRANSCOM, a satellite-based tracking and communications system, to monitor shipments of spent nuclear fuel and high-level waste "at frequent intervals," to provide DOE with data regarding shipments and to allow communications between vehicle operators and a central communications station. Operations on the branch line would meet Federal Railroad Administration standards for maintenance, operations, and safety (USDOE, 1999a).

There would be about 47 operational employees. The UPRR currently maintains crew change points at Elko and Winnemucca, and the Town of Crescent Valley or Elko could be used as the home terminal for crews operating on the Carlin corridor. The normal run time from Beowawe to the proposed repository would be about nine hours. If crew changes occur at Elko or Winnemucca, the total run time for the crew, from the change point to the repository, would be

up to 10.5 hours. Since the maximum shift allowed for railroad workers is currently 12 hours, crews would lay over at the proposed repository before returning. The length of the Carlin corridor would affect operations, add layover costs, and require careful scheduling to avoid extended layovers (Moore, 2001a).

According to the DOE, armed escorts would be required for shipments in heavily populated areas only (USDOE, 1999a).

The DOE says there is a possibility of shared use of the Carlin rail line, including service for mine operators in the central mountain valleys of Nevada; freight service options for Tonopah, Beatty, Goldfield, and Pahrump; and rail access to the Nevada Test Site (USDOE, 1999a). The DOE does not specify what types of materials (hazardous, non-hazardous, radioactive, military, civilian, or otherwise) would be shipped to or from the Test Site. The Test Site does accept low-level radioactive waste for disposal from approved generator sites (USDOE, 1999a).

To transport SNF and HLW to the proposed repository, the DOE would use either general or dedicated freight service. The same rail car configuration would apply in either case, but train make-up could vary (Moore, pers. comm., 2001). If general freight were utilized, shipments would occur as parts of other trains, and transfers between trains would occur. Shipments would be switched out of general freight trains at the wye connection to the spur line or at a railroad switching yard. Rail cars carrying shipments would be taken to the repository immediately or parked on a side track at the connection point until a train is assembled for travel to the proposed repository within 48 hours, in accordance with USDOT regulations. Railroads would route shipments of SNF and HLW to provide expeditious travel and the minimum practical number of interchanges between railroads (USDOE, 1999a; Moore, 2001a). (Despite the assurances of expedited handling and a 48-hour limit on parked rail cars, Eureka County is concerned that the general freight option would result in frequent and nearly continuous storage of radioactive shipments near Beowawe.)

If dedicated freight service were used, rail cars would be transferred from the main line to the branch line and shipped immediately to the proposed repository. Rail cars carrying SNF and HLW casks would not be switched between trains in classification yards. At a minimum, a crew change would be required at Beowawe, or the train would be switched to locomotives owned by the DOE or a contract operator. Trains would stop at Beowawe only to secure movement authority (USDOE, 1999a; Moore, 2001a).

Operation of the branch rail line would include shipments in both directions, to and from the proposed repository. Shipments to the proposed repository would include the delivery of 10,000 empty disposal containers from manufacturers. Shipments from the proposed repository would include rail cars carrying empty shipping casks, empty shipping canisters, and related components, which would be decontaminated prior to the outbound trip. Wastes generated at the proposed repository from decontamination and other housekeeping activities would also be collected and shipped off site for disposal at permitted facilities. These wastes include low-level radioactive waste, hazardous waste, industrial solid waste, and mixed waste (USDOE, 1999a).

Note that the DOE must clarify the mode of shipment of wastes from the proposed repository. The DOE estimates over 9,500 truck shipments of various types of wastes would occur during an unspecified period of operations (USDOE, 1999a). Eureka County has a right to know, for purposes of evaluating the proposed action and monitoring actual operations, if any, exactly what materials would be shipped through the County, and in what volumes.

Activity levels during operations. Each train bound for the proposed repository would consist, at a minimum, of two 3000-4000 horsepower locomotives, buffer cars, an escort car, and rail cars carrying SNF and HLW shipment casks. The actual number of cars would be a function of the delivery schedule and whether the DOE uses general or dedicated freight service. (USDOE, 1999a; Moore, 2001a). Although the length of the trains would vary, a typical train would be about 1,300 feet in length, consisting of three locomotives, a buffer car, up to ten cask cars, a second buffer car, and an escort car (Moore, 2001b).

The DOE estimates about four trains per week with shipments of SNF and HLW would travel to the proposed repository, plus one train per week carrying such other materials as empty disposal containers, bulk concrete materials, steel, large equipment, and building materials. The number of trains operating on the proposed line would vary significantly over time, and the number of unloaded trains leaving the proposed repository would not necessarily be the same as the number of loaded trains traveling to the repository. For purposes of noise analysis, the DOE assumes the trains would travel no faster than 49 miles per hour (mph). Elsewhere in the DEIS, the DOE says trains would travel at 37 mph in rural areas, such as the proposed Carlin corridor (Moore, 2001b; USDOE, 1999a).

Looking at the State of Nevada as a whole, over a potential 38-year period of shipments, 891 and 988 shipments of SNF and HLW would enter Nevada from the west, through the Truckee and Feather River canyons, respectively. At the Utah State line, east of Wells in Elko County, 19,319 shipments would enter Nevada from the east. Over 38 years of operations, commuting workers on the Carlin rail spur would travel over 100 million km in their vehicles (USDOE, 1999a, adjusted by the editor to 38 years).

Accidents during operations

Accidents, generally. As discussed briefly in the preface to this report, serious accidents do occur on the nation's transportation system. There is a finite possibility that an accident involving a shipment of SNF or HLW could occur in Eureka County. Human factors, such as rules violations by train crews and improper train handling, may be the greatest cause of railroad accidents, nationally and in Nevada. Causes attributed to human factors may be under-reported by the railroads (Meeker, 1992).

In a seven-and-one-half year period from February 1979 to August 1986, 12 railroad accidents in Nevada were reported to and investigated by the Federal Railroad Administration (FRA) on the SPRR, WPRR, and UPRR tracks. Although the railroads reported that 3 accidents were caused by human factors, the FRA determined that 6 accidents were from that cause. Other typical causes include track and roadbed failures, and electrical and mechanical failures (Meeker, 1992).

The frequency of railroad accidents is greater at low speeds and decreases at higher average train speeds. The frequency of high-speed accidents is a function of the condition of the track and track structure, track curvature, gradient, and the presence of major rail yard facilities (Meeker, 1992).

In addition to those accidents mentioned in the preface, Meeker (1992) describes two train wrecks that occurred in northern Nevada. In June, 1969, five freight cars carrying unfused military bombs exploded near the Tobar siding, about 70 miles east of Elko. The train was traveling at 50 to 55 mph. The cause of the explosion, which resulted in four injuries and the destruction of six freight cars, was not determined.

In March, 1970, a WPRR freight train collided with a SPRR freight train near Floka, about 55 miles west of Winnemucca. The accident was caused by the WPRR train moving out of control, due to an air brake system defect. The wreck killed two employees, injured one employee, and destroyed three locomotives and 17 freight cars (Meeker, 1992).

In 1995, the SPRR ordered its employees, including those in Nevada, to be on the alert following a fatal Amtrak train wreck near Hyder, AZ. The Amtrak passenger train fell 30 feet from a bridge; one crew member was killed and at least 78 persons were injured. A saboteur apparently removed spikes and tampered with rail signals (Henderson, 1995).

Eureka County is particularly concerned about accidents involving explosions adjacent to the existing UPRR tracks or the proposed Carlin Rail line. The bulk propane storage facility at Beowawe and a potential ethanol production facility at Dunphy (about 10 miles north of Beowawe, also in Eureka County) may represent explosion hazards.

Radiological accidents. The most severe accident scenarios applicable to operations of the rail spur would be those that release radioactive materials. Although such accidents would be unlikely, they would result in human health consequences. The Nuclear Regulatory Commission estimates that over 99 percent of rail and truck accidents involving SNF and HLW would release no contents of the shipping casks. The two main variables that would determine the severity of an accident are the amounts of mechanical force (deformation) and thermal energy (heat) applied to shipping casks (USDOE, 1999a). Nevada's Agency for Nuclear Projects is evaluating worst case accident scenarios, which could involve locations on the existing UP tracks at the Carlin tunnel or Beowawe. Wind direction is a key variable in the description of a worst-case accident (A. Johnson, pers. comm., 2001).

The "release fraction" is defined as the fraction of radioactivity in each shipping cask that would be released in a given accident, and is a function of the type of material being shipped and the physical and chemical properties of its radioisotopes. Most radionuclides in SNF are in a chemically and physically stable, solid, nondispersible form. Gaseous radionuclides (e.g., krypton-85) would be released if fuel cladding and cask containment boundaries were compromised. Release fractions range over six orders of magnitude, depending on material type. The largest release fractions are for gases, from which more than half the radioactivity would be released to the environment in a severe Category 6 accident. The smallest release fractions are for particulates, from which 20 parts in 1 million, or less, of the radioactivity would be released.

However, Nevada's Nuclear Waste Project Office says that the DOE's estimates of radioactive releases and their probabilities of release might significantly underestimate releases and probabilities (USDOE, 1999a).

People would be exposed to radiation released in a transportation accident through these pathways: (1) inhalation and direct exposure resulting from exposure to a gaseous plume, referred to as "cloudshine," (2) ingestion of contaminated crops, (3) direct exposure from contaminants released to the ground, referred to as "groundshine," and (4) inhalation of resuspended particles. Worst-case human exposure scenarios would probably involve local, difficult-to-evacuate populations, such as those in schools, prisons, hospitals, and nursing homes (USDOE, 1999a).

In the event of an accident involving SNF or HLW, the train crew would (if they are able) notify local authorities and an unnamed central communications station. The DOE would make resources available to local authorities as appropriate to mitigate an accident (USDOE, 1999a). The DOE would be the shipper of record and would be responsible for mobilization of resources (Moore, pers. comm., 2001).

Emergency preparedness. The DOE would, as requested, assist state, tribal, and local governments with preparation for accidents by: (1) providing technical assistance, (2) providing money to train public safety officials, (3) requiring transportation contractors to comply with American National Standards Institute (ANSI) requirements to prepare emergency response plans and provide resources for isolating and cleaning up spills, and (4) maintaining a 24-hour emergency response program, available on request (USDOE, 1999a).

Cumulative project description

Potential impacts of the transportation of SNL and HLW through Eureka County will not occur in a vacuum. Together with other actions of private and public entities, the proposed action may have significant impacts, over and above those that would be caused by the proposed action in isolation.

Additional actions that could combine with the proposed action to produce impacts include: (1) expansion of mining in the Crescent Valley, including expansion of the Pipeline project of Cortez Gold Mines, Inc., (2) operations of staging areas for training aircraft and enemy aircraft, and air-to-air and electronic warfare training areas, associated with NAS Fallon and located over portions of the Carlin corridor, (3) the proposed construction of a storage facility for SNF at the Skull Valley Indian Reservation in Tooele County, Utah (U.S. Navy and BLM, 2000; Federal Register, February 9, 2000), and (4) Sierra Pacific Power Company's proposed Falcon to Gonder 345 kV transmission project, which would cross the Crescent Valley (USDOI, 2001).

FINAL
August 2001

Part 3:

AFFECTED ENVIRONMENT

A. Overview and General Setting

Eureka County, located in north-central Nevada, comprises 4,176 square miles of land. Two major highways cross the County from east to west: Interstate 80 in the north and U.S. 50 in the south. The Interstate and the existing tracks of the UPRR roughly parallel the course of the Humboldt River. The seat of Eureka County government, the Town of Eureka, is located on U.S. 50 in the southeast portion of the County. (See location maps, Figures 5a, 5b, and 5c.)

Eureka County's population, according to the 2000 federal census, is 1,651. About two-thirds of the population lives in the southern portion of the County. Employment in 1997 consisted of 5,188 full-time and part-time positions (Fletcher, 2001). Mining is a major economic activity in the county. About 19 percent of the land area is private property, and about 81 percent is owned and managed by the United States government. In the northern portion of the County, a checkerboard pattern of private and public ownership predominates.

B. The Natural Environment

Climate and hydrology, generally

Between the Union Pacific (UP) tracks near Beowawe and the proposed geologic repository at Yucca Mountain, the proposed Carlin rail corridor passes through 11 hydrographic basins. In northwestern Eureka County, the proposed corridor passes through the Crescent Valley hydrographic area, which the State Engineer has numbered Basin No. 54. It is a designated groundwater basin with a perennial yield of about 16,000 acre-feet per annum (afa) (USDOE 1999a).

The topography of this region is typical of the Great Basin subprovince of the Basin and Range physiographic province, with north- to northeast-trending mountain ranges separated by alluvial valley floors (USDOE, 1999a; USDOI, 1999).

The Crescent Valley is a semi-enclosed basin within the Humboldt River Basin, bounded on the west by the Shoshone Range, on the east by the Cortez Mountains, on the south by the Toiyabe Range, and on the north by the Dry Hills and the Humboldt River. The drainage basin is 45 miles long and 20 miles wide, with an area of about 750 square miles. The maximum elevation is 9,680 feet above mean sea level (amsl) at Mount Lewis in the Shoshone Range. The minimum elevation is 4,695 feet amsl at the north end of the Valley, near Beowawe (USDOI, 1999).

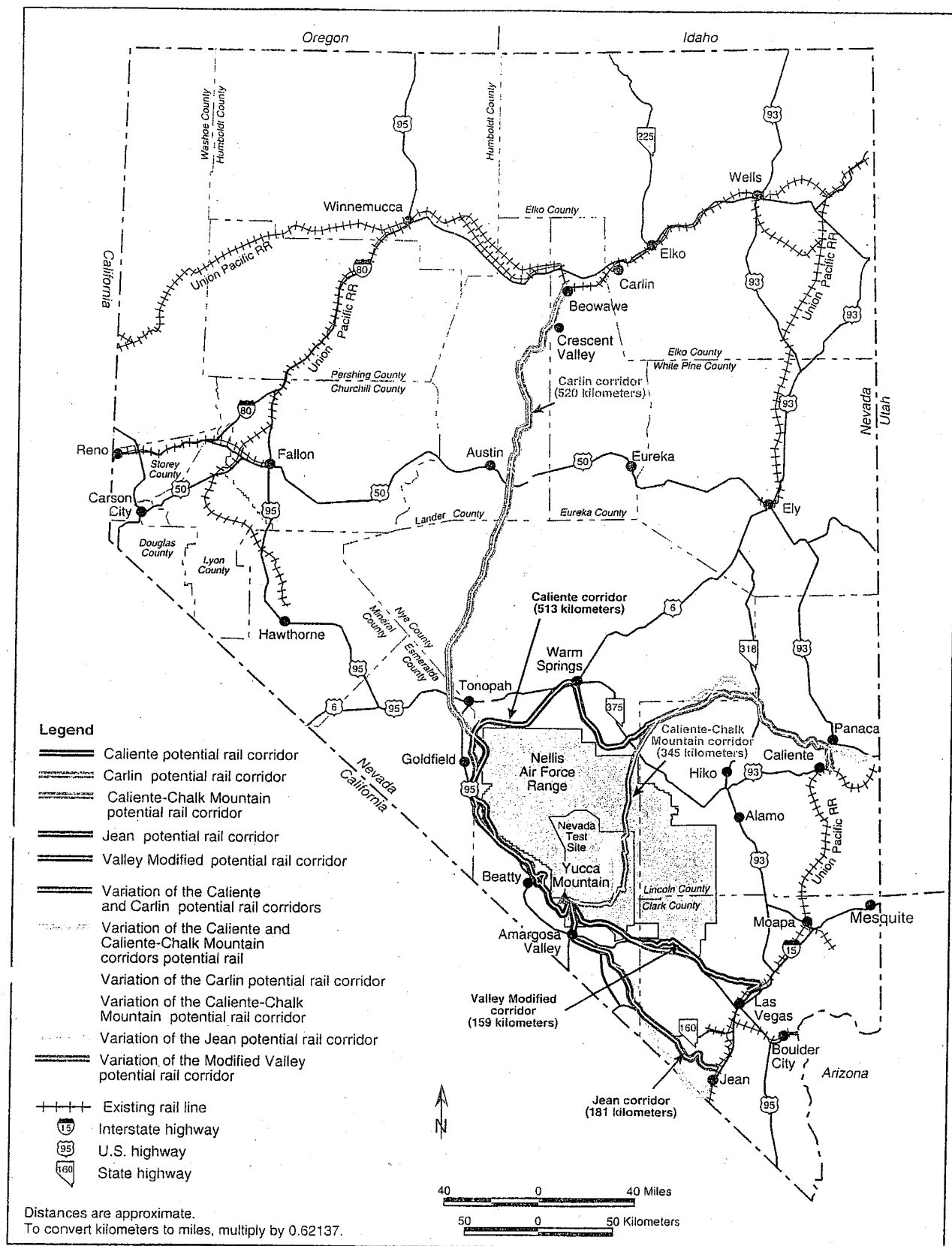


Figure 5a
General location map
(Source: USDOE, 1999a)

Figure 5b
Eureka County Map

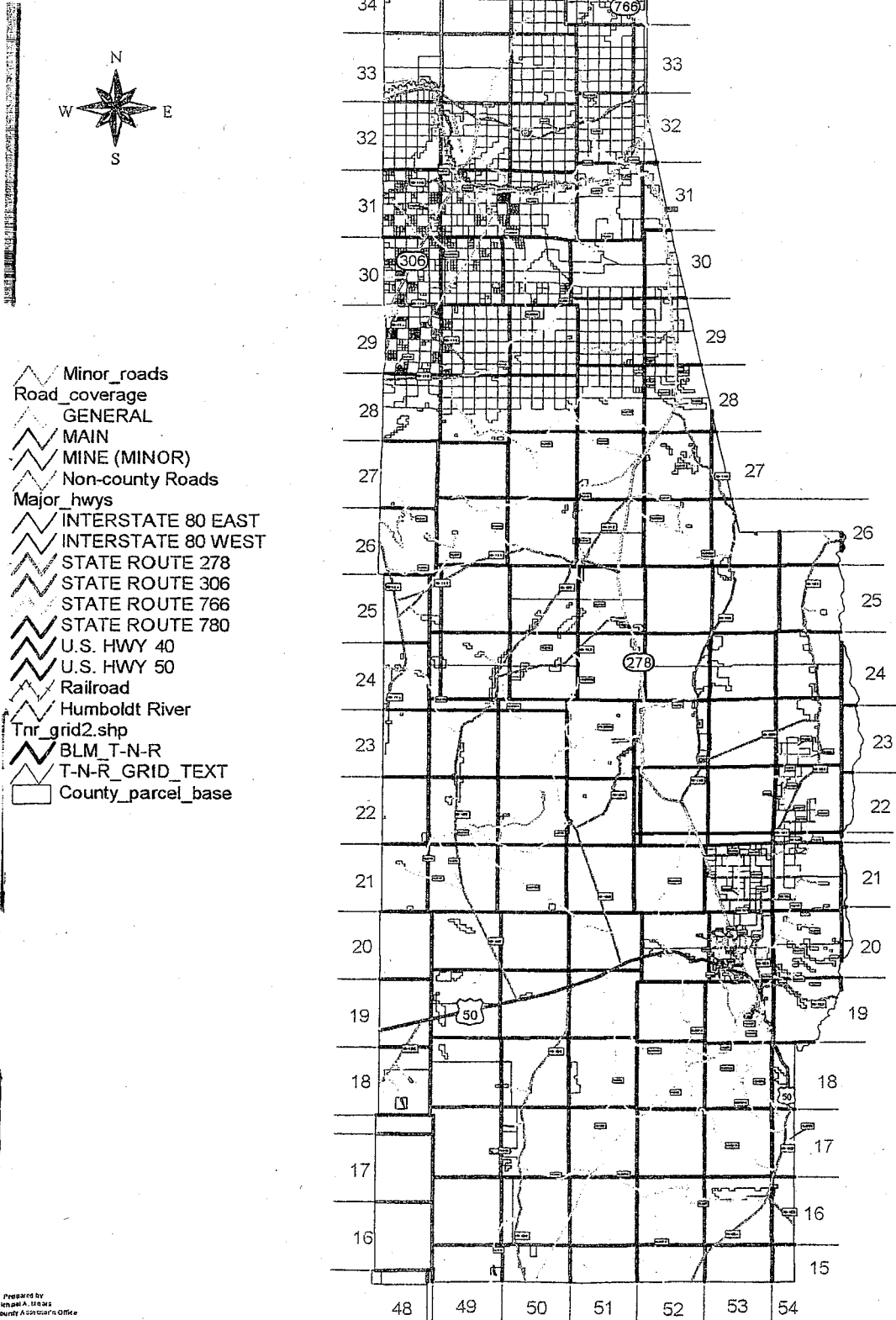
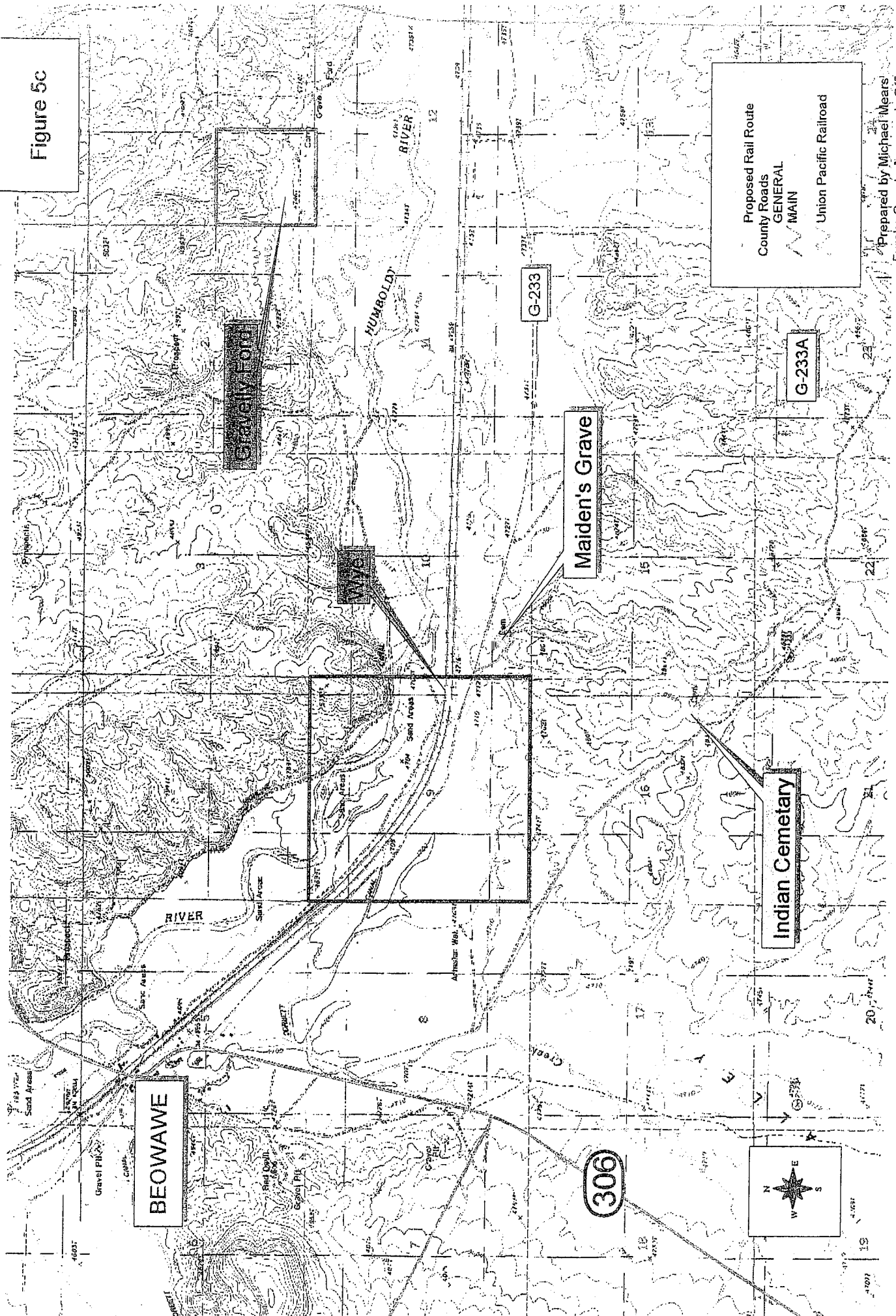


Figure 5c



Prepared by Michael Mears
Eureka County Assessor's Office

The terrain the proposed rail line would cross is relatively flat, with a gradual upslope from the connection point to the UPRR. The cross sections of the proposed corridor are also flat (Moore, 2001b).

Low precipitation and humidity characterize the Crescent Valley's climate, which is similar to that of northern Nevada generally. Local precipitation records at Cortez mine (elevation 5,000 feet) for the period 1967 through 1996 show an average annual precipitation of 8.37 inches. Records from Beowawe (elevation 4,696 feet) for the same period show an average annual precipitation of 8.77 inches, and for the 1941 through 1995 period, 7.94 inches. July through October are the driest months, and April through June are the wettest (USDOI, 1999; *see also* precipitation table, this reference, p. 4-13).

The estimated total annual precipitation for the hydrographic basin is approximately 453,000 acre-feet, distributed as follows (USDOI, 1999):

| | |
|-------------------|-------------------------------------------------|
| below 4,700 ft | less than 8 inches average annual precipitation |
| 4,700 to 5,800 ft | 8 to 12 inches |
| 5,800 to 6,600 ft | 12 to 15 inches |
| 6,600 to 8,000 ft | 15 to 20 inches |
| above 8,000 ft | over 20 inches |

The center of the Crescent Valley consists of dry lake beds, separated from the Humboldt River by a low topographic divide at the north end of the valley. Water enters Basin No. 54 primarily as precipitation and is discharged primarily through evaporation and transpiration. Relatively small quantities enter as surface flow and groundwater underflow from the adjacent Carico Lake Valley at Rocky Pass, where Cooks Creek enters the southwest end of the Crescent Valley. Evapotranspiration in the valley provides a buffer that keeps recharge and discharge in balance. As discharge from consumptive uses increases and lowers the water table, discharge from evapotranspiration decreases (USDOI, 1999).

Potential evaporation from the Basin is far greater than the amount of water entering the Basin from precipitation and inflow. There are no year-round water bodies in the Crescent Valley. Most streams are intermittent or ephemeral, draining toward the center of the basin. Some streams (e.g., Indian Creek) have flow throughout the year in locations where perched groundwater contributes to springs that flow into streams (USDOI, 1999).

Only during times of exceptionally high flow do surface flows reach the lower slopes of the alluvial fans and reach the floor of the Crescent Valley. Runoff is likely to be higher from the Cortez Mountains, where the alluvial fans are steeper. Therefore, surface flow reaches the valley floor more frequently on the east side of the Valley (USDOI, 1999).

Soils in this area are fragile and easily disturbed, and may not recover from disturbance on their own. Compaction of the soils increases erosion risk (Eureka County, 2000).

Water resources

Surface water. According to the United States Geological Survey (USGS), the baseflow of the Humboldt River at Beowawe was determined in 1992 to be 30.9 cfs (22,327 afa), consisting of 17.9 cfs of streamflow and 13 cfs of irrigation diversions (USDOI, 1999).

None of the streams in the Crescent Valley are categorized as perennial streams for their entire length. A number of dry lake beds, or playas, occur in the central valley floor. The playas typically contain water temporarily after substantial storm and snowmelt events. Most of the runoff in the area is derived from snowmelt. A large percentage of annual precipitation falls as snow, and runs off from April through June. When spring-season rain coincides with snowmelt runoff, very high flows result. When available, surface water in some areas of Crescent Valley is used by wildlife and for mining, livestock, and irrigation. Runoff from the Crescent Valley does not flow into the Humboldt River, except for runoff from Coyote Creek, an intermittent creek that flows north from the Malpais, and several small ephemeral streams flowing north from the Dry Hills. At the south end of the Valley, surface water flow in Carico Lake Valley flows into Cooks Creek, which enters Crescent Valley through Rocky Pass and becomes dry after about one mile (USDOI, 1999; *see also* detailed descriptions of surface water drainages in the Crescent Valley for the Toiyabe Range and northeast Carico Lake Valley, the Cortez Mountains, the Dry Hills, and the Shoshone Range, this reference, p. 4-16).

Numerous springs occur on the valley floor near the toes of the alluvial fans, with an estimated combined flow of up to 50 gpm. Near the Dean Ranch in Eureka County, there are eight to ten flowing wells and springs. The estimated total combined discharge rate of springs and seeps in the Crescent Valley is 250 to 300 afa. Three of the spring systems in the Crescent Valley are thermal: near the south extremity of the Dry Hills, at Hot Springs Point, five springs with a total flow of about 100 gpm; Chillis Hot Springs near Rocky Pass, with an estimated flow of about 10 gpm; and a spring west of Hand-Me-Down Creek at the base of the Cortez Range (USDOI, 1999). A point of interest, the Beowawe Geysers (now in use for geothermal energy production), is located southwest of Beowawe in the Whirlwind Valley (NDOT, 1989; A. Johnson, pers. comm., 2001).

According to the DEIS for the proposed geologic repository (USDOE, 1999a), surface water resources in the portion of the proposed Carlin rail corridor between Beowawe and Austin include: (1) Tub spring, northeast of Red Mountain, 0.5 km from the corridor, (2) Red Mountain Spring, east of Red Mountain, 0.8 km from the corridor, (3) Summit Spring, west of the corridor and south of Red Mountain, 0.9 km from the corridor, (4) Dry Canyon Spring, west of Hot Springs Point, 0.4 km from the corridor, and (5) an unnamed spring on the east slope of the Toiyabe Range, southwest of Hot Springs Point, 0.8 miles from the corridor.

Surface water quality data for the Crescent Valley area is limited. Three surface water samples were collected from Indian Creek, Mill Creek, and Fire Creek in 1992; three hot springs were also sampled in the same year. Constituents present in the samples included TDS, aluminum, arsenic, silver, and others. In the Crescent Valley, 24 springs have been designated for quarterly monitoring, and seven springs for semi-annual monitoring. Flow, conductivity, pH, and dissolved oxygen are being monitored at four springs at Rocky Pass; six springs in the Toiyabe

catchment; 12 springs in the Shoshone range; eight springs in the east Valley, and one in the peripheral area (USDOI, 1999).

Groundwater. The saturated alluvial sediments beneath the floor of the Crescent Valley store a large volume of groundwater. Groundwater in the Cortez Mountains and the Shoshone Range surrounding the valley occurs mainly in joints and fractures in metamorphic and sedimentary bedrock. Most precipitation in the mountains travels downslope in ephemeral streams and enters the regional groundwater system as it crosses the alluvial fan. Large quantities of groundwater are stored in the alluvial aquifer beneath the valley floor, where the alluvium may be up to 9,300 feet thick in some places (USDOI, 1999).

The water table at the Town of Crescent Valley is about 60 feet deep (elevation 4,730 feet), and at Beowawe, about 20 feet deep (elevation 4,691 feet). The flow direction is generally northeasterly, along the axis of the Basin (USDOI, 1999; *see also* map, this reference, figure 4.4.5.) Most of the proposed route crosses areas of the Crescent Valley where the groundwater lies close to the surface, within 15 to 20 feet, as indicated by the phreatophytic vegetation types, according to the BLM (Moore, 2001b).

The natural flow of groundwater from the Crescent Valley discharges into the Humboldt River between Rose Ranch and Beowawe during normal flow conditions. Its contribution to the Humboldt River's baseflow is about 0.9 cfs (650 afa). Another estimate places the average annual net discharge rate at between 700 and 750 afa (USDOI, 1999).

Estimated groundwater pumpage for the Crescent Valley is estimated at less than 8,000 afa. Consumptive use is about 4,000 afa, and the balance is recharged. In addition, the Pipeline Project of Cortez Gold Mines (CGM), Inc. is authorized to use 2,367 afa consumptively (USDOI, 1999). The amount of consumptive use authorized for CGM may have increased with approval of the South Pipeline project.

Based on sampling conducted in 1992 through 1997 in the Crescent Valley, alluvial water quality is generally good. It meets most primary and secondary drinking water standards, and is suitable for mining, irrigation, and livestock. It contains calcium, magnesium, and sodium cations and chloride, sulfate, and bicarbonate anions. The average concentration of manganese is higher than Nevada's secondary water quality standard of 0.05 mg/liter. For the same period, sampling of the bedrock aquifer in the southwest portion of the Crescent Valley indicated that the water quality was similar to the alluvial water quality, with higher concentrations of minerals. The average concentrations were less than or equal to the primary drinking water standards, except for cadmium. The bedrock aquifer water is suitable for mining, irrigation, and livestock. It contains the same anions and cations as the alluvial water. The average concentrations are higher than Nevada's secondary drinking water standards for TDS, fluoride, iron, and manganese. These elevated metal concentrations are not unexpected (USDOI, 1999).

Flooding. Flooding typically occurs in the Humboldt River Basin during the winter and spring. Winter floods are caused primarily by large rainstorms falling on low-lying snow or frozen ground. Winter floods are usually of a high volume and short duration. Spring floods occur with the snowmelt, which can be accelerated by heavy rains. Summer flash floods occur from

localized high-intensity storms, and at times the runoff volume from flash floods may be greater than from spring snowmelt. Flash floods may deposit large volumes of debris and sediment on the uplands or the playa (USDOI, 1999). (See flood plain map, Figure 2.)

Heavy flooding on the Humboldt River itself has been documented in: (1) December 1861 through January 1862, (2) December 1867 to January 1868, at Winnemucca, (3) May and June, 1884, (4) March through June, 1890, after the "white winter" of 1889-1890, (5) March 1907, where the Southern Pacific Railroad tracks in the lower basin were damaged, (6) February and March, 1910, when the Southern Pacific and Western Pacific tracks were damaged, (7) April and May, 1942, and January 1943, at the upper Humboldt River in Elko County, where railroad tracks and highways were washed out, (8) February through May, 1952, and (9) February 1962, when damage occurred to U.S. 40 (now I-80) and the Western Pacific tracks in Elko County. Flooding destroyed over 30 miles of railroad track of the Eureka and Palisade Railroad in February and March, 1910 (Thompson, 1987).

According to the Federal Emergency Management Agency (1998), the area of the 100-year flood includes land adjacent to the north and south banks of the Humboldt River, as well as an area running south from Beowawe (following Coyote Creek at the north end for about four miles) at least 15 miles in length, and passing about 1.5 miles to the east of the Town of Crescent Valley. Generally speaking, the width of this area is greater than one mile. The area of the 100-year flood also includes an area less than ¼ mile wide, running generally east-west across the Crescent Valley, joining with the larger north-south flood area about three miles southeast of the Town of Crescent Valley, and following the alignment of Thomas Creek. (See map, Figure 2.) The Crescent Valley has been subject to recent flooding at depths up to four feet in some locations (Eureka County, 2000).

Water use and water rights. Nevada's State Engineer classifies the Crescent Valley hydrographic basin as a designated basin, in which withdrawal and use of groundwater is regulated. Evaporative losses may be treated as a consumptive use and accounted as a water right, at the discretion of the State Engineer (USDOI, 1999).

Cortez Gold Mines (CGM), Inc., holds senior certificated water rights for agricultural and mining use in Crescent Valley. CGM filed multiple applications with Nevada's Division of Water Resources (DWR) to appropriate water for mining, milling, dewatering, and domestic purposes. Each application covers a 160-acre quarter section. The total continuous diversion rate, combined, would be 67 cfs (30,074 gpm). The DWR approved the applications. If the proposed diversion is greater than 67 cfs, or if consumptive use is greater than 2,362 gpm, additional water rights are required. CGM has filed additional water rights applications (USDOI, 1999; *see also* inventory of water rights for southern part of the Crescent Valley, this reference, figure 4.4.11 and table 4.4.10).

The only municipal groundwater rights in the hydrographic basin are those of the Town of Crescent Valley (USDOI, 1999).

According to the DWR, as of 1997, surface water rights existed for springs and streams in the Crescent Valley, including: Upper Indian Creek; Mud Spring; Corral Canyon; Hot Springs Point;

Scotts Gulch; Dewey Dann Creek; Duff Creek; Fire Creek; Frenchie Creek; Mule Canyon; Brock Canyon; Hand-Me-Down Creek; Four Mile Canyon; Little Cottonwood Creek; and Mill Canyon. Historic use of surface water from Indian Creek is reported at the Dean Ranch (USDOI, 1999).

Seismicity

The BLM has inventoried historic earthquake activity in this area. For the nearby South Pipeline project in Lander County, the BLM said that the operating basis earthquake (OBE) had a peak ground acceleration of 0.21 g and an expected return period of 450 years, and that seismic events could result in slope failures or structural damage to mine facilities, if the OBE were exceeded (USDOI, 1999).

Air resources

The Crescent Valley Air Basin (CVAB) includes the area bounded by the crest of the Shoshone Range and the Tuscarora Mountains to the north and west, and the crest of the Toiyabe and Cortez Mountains to the south and east. Its boundaries are the same as the boundaries of the Crescent Valley hydrographic basin. The Crescent Valley is a high desert environment, arid to semi-arid, with bright sun, low annual precipitation, and large daily temperature variations. The climate is controlled by the topography to the west, particularly the Sierra Nevada range. The average annual temperature at the Elko airport is 46 degrees F. The annual average temperature at Cortez in 1997 was 53 degrees F, and the recorded range of temperatures was from -1 degree F to 98 degrees F (USDOI, 1999).

Prevailing winds at the Cortez station in 1997 were from the *east* at 7 mph. The estimated annual average mixing height in the area of CGM's Pipeline Project at the southern end of the Crescent Valley is 250 feet (a.m.), and 2,400 feet (p.m.). Dispersion conditions at the Cortez station were classified as good, 70 percent of the time in 1997 (USDOI, 1999).

From a regulatory perspective, the CVAB is unclassified for all pollutants for which a national ambient air quality standard (NAAQS) has been established. The nearest nonattainment area for particulate matter up to 10 microns in diameter (PM10), carbon monoxide (CO), and ozone (O3) is Washoe County, Nevada, about 100 miles to the east. The nearest nonattainment area for sulfur dioxide (SO2) is the Steptoe Valley, about 100 miles to the east-southeast (USDOI, 1999).

Nevada's Bureau of Air Quality (BAQ) was not monitoring air quality in the CVAB as of 1999. CGM monitored PM10 at two locations: the Cortez station and 1.5 miles southwest of the Pipeline mill. For 1997, the average 24-hour and annual average concentrations of PM10 were from 22 to 27 micrograms per cubic meter (ug/m3). The maximum 24-hour PM10 concentration was in the range of 83 to 119 ug/m3. For PM10, the BAQ assumes a background concentration of 10.2 ug/m3 for both the 24-hour and annual average. However, for the Pipeline project, BAQ selected a background value of 22 ug/m3, based on the 1997 monitoring. The BAQ has not defined background concentrations of CO, nitrogen dioxide (NO2), and SO2 for the CVAB (USDOI, 1999).

The U.S. Environmental Protection Agency (USEPA) designates Class I airsheds to prevent further deterioration of air quality in national parks and wilderness areas created before 1977, plus additional areas. The nearest Class I airshed to the Crescent Valley is the Jarbidge Wilderness Area, about 118 miles to the northeast (USDOI, 1999).

Vegetation and soils

The area of Eureka County that would be affected by the proposed rail corridor is part of the central Great Basin. It is a cold desert with low rainfall. There are three main plant communities in the valleys and the lower mountain slopes: the shadscale (*Atriplex confertifolia*) community; the sagebrush (*Artemisia tridentata*) community; and the pinon-juniper (*Pinus monophylla*, *Pinus edulis*, *Juniperus osteosperma*) community. The floor of the Crescent Valley consists of finer grained sediments and deep-rooted phreatophyte vegetation types, primarily saltgrass and greasewood, which thrive on the shallow groundwater in the area (USDOI, 1999). According to the Department of Energy, the predominant vegetation in the proposed Carlin corridor, from Beowawe to Beatty Wash, includes salt desert scrub (57 percent), sagebrush (28 percent), and greasewood (7 percent). The DOE says there are five riparian areas between Beowawe and the south end of Grass Valley: at Skull Creek, Steiner Creek (ephemeral), Ox Corral Creek (ephemeral), Water Canyon, and Rye Patch Canyon (USDOE, 1999a).

Special status plant species in the area include Eastwood's milkweed (*Asclepias eastwoodiana*) and Elko rockcress (*Arabis falsifruta*). Both are considered sensitive by the Bureau of Land Management and are on the watch list of the Northern Nevada Native Plant Society. The habitat preference of the former species is low alkaline clay hills or shallow, gravelly drainages. It occurs in association with shadscale, budsage, greasewood, and horsebrush, at elevations from 5,300 to 6,900 feet. The latter species prefers moderate to steep north-facing slopes in light sandy ash soils, in the sagebrush/rabbitbrush/bluegrass community, from 5,300 to 6,100 feet (USDOI, 1999).

According to Nevada's Natural Heritage Program, there are about 12 mapped occurrences of sensitive species in the northern half of Eureka County. One such site is the Kobeh Valley macrosite of the Hot Springs Hill site. It is ranked 1 (highest) for biodiversity significance, protection urgency, and management needs. It is on lands managed by the BLM at an elevation of 6,120 feet, and is approximately 0.3 miles wide. Common names of the plants found at the site include the one-leaflet Torrey milkvetch and the Monte Neva paintbrush (NNHP Scorecard, 1998).

Noxious weeds are a major problem in Nevada and the western United States. They threaten the livelihood of all who depend on the use of the range; they are easily spread by wind, livestock, other animals, persons on foot, and motor vehicles; and they are difficult or impossible to control once established. Disturbed soils are especially vulnerable to colonization by noxious weeds (Eureka County, 2000). Infestations of hoary cress or whitetop (*Cardaria draba*) and saltceder or tamarisk (*Tamarix sp.*) are present in the vicinity of CGM's Pipeline project at the south end of the Crescent Valley. The mine's monitoring and control plan identifies five other noxious weed species suited to the soils, climate, and conditions in the area, including: (1) spotted knapweed (*Centaurea maculosa*), (2) diffuse knapweed (*Centaurea diffusa*), (3) yellow

starthistle (*Centaurea solstitialis*), (4) Scotch thistle (*Onopordum acanthium*), and (5) leafy spurge (*Euphorbia esula*) (USDOI, 1999).

Soils in the Crescent Valley are generally high in alkalinity. The valley floor includes playa deposits that consist of finer-grained sediments. The Crescent Valley alternative corridor for the proposed rail line crosses an area of alkali flats. These soils are typically difficult to revegetate following disturbance, especially in an arid climate (Moore, 2001b). (See generalized soil map of the Crescent Valley, Figure 6.)

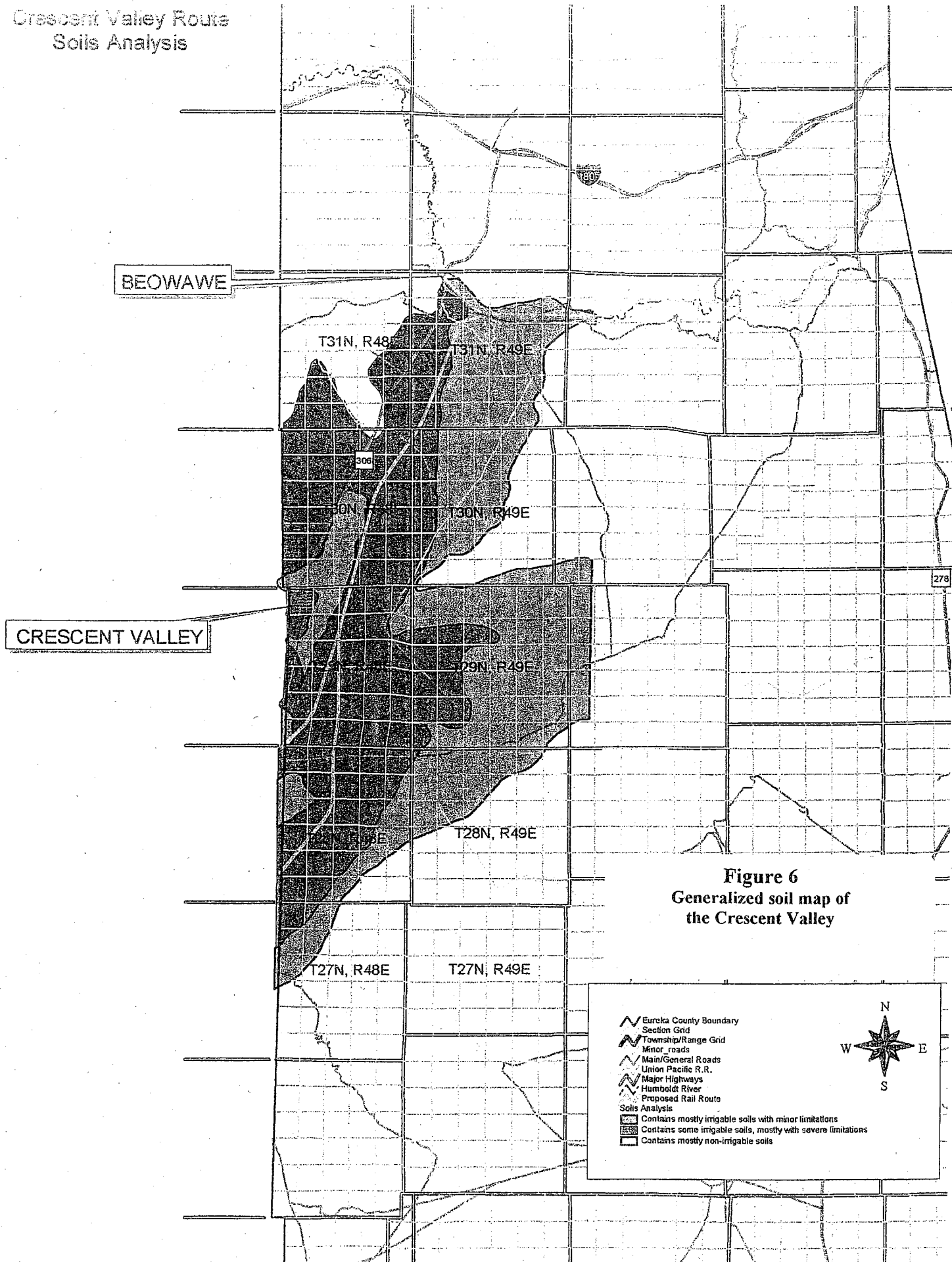
Wildlife and fish

Mule deer occupy the mountainous portions of the Shoshone, Toiyabe, and Cortez ranges, where they prefer the elevations and vegetation above the valley floors. The deer winter at elevations where water, shelter, and forage are more readily available. (USDOI 1999, p. 4-125) Winter deer range exists in the vicinity of Beowawe, including the Horseshoe Ranch, and a deer migration route connects winter range in the Dry Hills, northeast of Hot Springs Point, and summer range to the north. According to McKenzie (pers. comm., 2001), some mule deer are found year-round in the vicinity of the Humboldt River. Nevada's Division of Wildlife (NDOW), the BLM, and others have spent money restoring winter range in this area (Eureka County, 2000). The Crescent Valley also supports an expanding population of pronghorn antelope, which NDOW transplanted into the area. The animals are now breeding there (USDOI, 1999).

According to NDOW, mountain lion populations exist in the mountainous portions of the Shoshone, Toiyabe, and Cortez ranges as well, and bobcats and badgers would also be expected in the area. Non-game mammals that exist in the vicinity include the kit fox, gray fox, and coyote, plus cottontail rabbit, white-tailed jackrabbit, mice, ground squirrels, and other rodents (USDOI, 1999). The pygmy rabbit, a sensitive species, is also known to inhabit the corridor area (McKenzie, pers. comm., 2001).

The BLM reports that sage grouse are commonly found in the area of the Shoshone Range, northwest of the site of CGM's Pipeline project (USDOI, 1999). Critical wildlife habitat near the corridor of the proposed rail line includes a sage grouse strutting area, or lek, located southeast of Beowawe, according to a DOE contractor (Moore, 2001b). Chukar use the steep, rocky, mountainous habitats in the Shoshone Range. Blue grouse and Hungarian (gray) partridge may inhabit the upper slopes of Mount Tenabo, according to NDOW. Game bird species that are known to occur in small numbers in the vicinity of the Pipeline project include the mourning dove, California (Valley) quail, and Wilson's snipe, which use the valley floor and foothill habitats as foraging areas (USDOI, 1999).

Crescent Valley Route
Soils Analysis



The Crescent Valley also supports scattered families of burrowing owls, which are on Nevada's list of protected animals. An active nest has been observed, north of CGM's Pipeline project area, since 1991, and there have been sightings of burrowing owls in the vicinity. Various raptors also frequent the Crescent Valley, including year-round residents, wintering hawks, and spring nesting birds. The Valley has a lack of perch and nesting sites in various areas (USDOI, 1999). One raptor present in the Valley is the Ferruginous hawk (McKenzie, pers. comm., 2001).

Non-game avian species in this vicinity include horned larks, sage thrashers, western meadowlarks, Brewer's and red-winged blackbirds, sage and Brewer's sparrows, swallows (various), and possibly black-throated sparrows. Western grebes nest at the Ruby Lakes and may pass through the Crescent Valley area. In the specific vicinity of CGM's pipeline project, migratory waterfowl and shorebirds are present, probably due to the operation of infiltration sites for dewatering (USDOI, 1999).

Regarding fish, surveys conducted for CGM's Pipeline project in 1996 found most streams in the area in a degraded condition, and mountain springs adversely affected by livestock and wild horses. Indian Creek supports a naturally sustaining population of non-native brook trout, and Frenchie and Duff Creeks supported populations of brook and brown trout when sampled in the mid-1980s, according to NDOW (USDOI, 1999).

(See also USDOI, 1999, pp. 4-126 to -128, for tables of 22 special status animal species that occur or may occur in the vicinity of CGM's Pipeline project, and their habitat preferences.)

Range

There are two BLM grazing allotments in the Eureka County portion of the Crescent Valley, to the north and south of the Town of Crescent Valley respectively, according to McKenzie (2001). (See Figures 7A, 7B, and 7C, maps of Crescent Valley grazing allotments.)

Geyser allotment. The Geyser allotment contains the northwest part of the Crescent Valley, plus the Eureka County portion of Whirlwind Valley and most of the north slope of the Argenta Rim, which extends into Lander County. The south, east, and north boundaries of the allotment are fenced. The south boundary runs about six miles across the Valley floor from the Town of Crescent Valley. The allotment includes 98,742 total acres, of which 52,107 acres are private property and 46,635 acres are managed by the BLM.

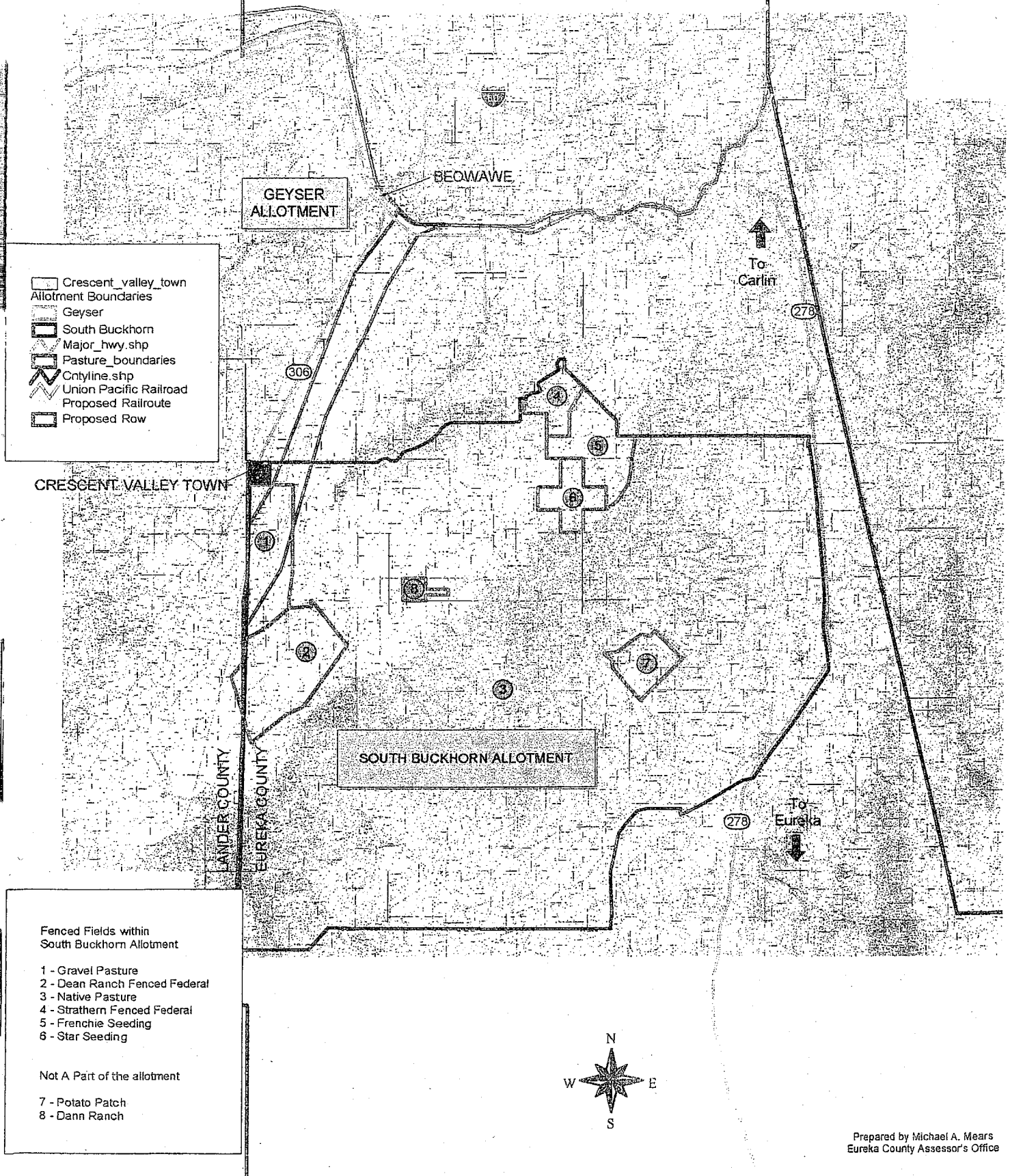
The primary sources of stock water for the Crescent Valley portion of the Geyser allotment are: a canal from the Humboldt River, Cold Springs, a pipeline along the eastern border, and hot springs in the southeast corner of the allotment.

The BLM has licensed Zeda, Inc., to use 1,227 animal unit months (AUM) from November 15 to March 15 on the Geyser allotment. Due to the presence of private land, Zeda, Inc., can run 2,231 AUMs. (One AUM is defined as one 1,000 pound cow or one 1,000 pound cow with a calf less than six months old, for a period of one month.) Due to the topography, the livestock tend to

Map 1 GRAZING ALLOTMENTS In Eureka County

Figure 7a

NOTE: Portion of Geyser Allotment in Lander County - not shown on this map.



Map 2
GEYSER ALLOTMENT

BEOWAWE

Corbett Canal

306

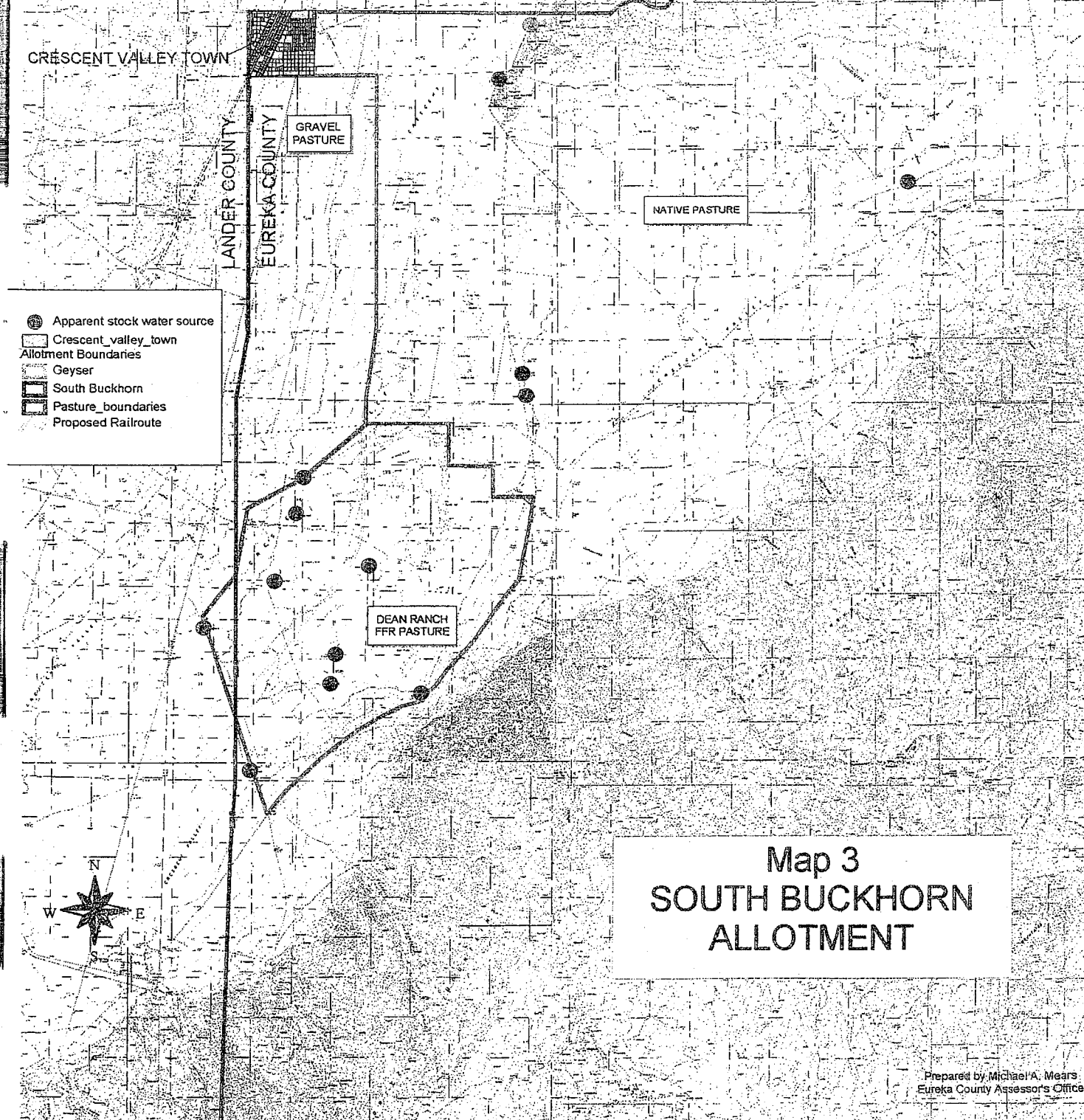
CRESCENT
VALLEY
TOWN

- Stock Water Source
- Canal
- Natural Boundary
- Allotment Boundaries
- Geyser
- South Buckhorn
- Union Pacific Railroad
- Proposed Railroute
- Proposed Row

Figure 7b



Figure 7c



remain near where they are turned out and, therefore, most of the use is in the Crescent Valley portion of the allotment.

South Buckhorn allotment. The South Buckhorn allotment contains the Eureka County portion of the Crescent Valley, south of the Town of Crescent Valley, plus a large part of the Cortez Mountains and the west side of Pine Valley. The allotment is completely fenced, except for a small, steep portion on the south boundary. It consists of 315,323 total acres, of which 222,004 are private, and 93,319 are public and managed by the BLM. Fences and topography divide the allotment into the following separate fields: Strathern field, Gravel field, Frenchie seeding; Star field; Upper Brock; Potato Patch; Native pasture; and Dean Ranch.

The primary sources of stock water in the Crescent Valley portion of the South Buckhorn allotment are: the hot spring east of the Town of Crescent Valley, water from the Town, flowing wells and springs in the Valley bottom, and springs and live streams flowing from the Cortez Mountains.

The BLM has licensed Cortez Joint Venture (CJV) to use 6,563 AUMs on the South Buckhorn allotment from April 16 to October 31, plus 273 AUMs of suspended non-use. The primary area for this use is in the western half of the allotment. At the present time, CJV is not running livestock. There are also five other users on this allotment: Slagowski Ranches, Inc. (7,497 AUMs plus 347 AUMs suspended non-use, mostly in the eastern portion of the allotment); Harold Rother (3,774 AUMs plus 157 AUMs suspended non-use, mostly in the eastern portion of the allotment); Hale Bailey (1,260 AUMs plus 52 AUMs suspended non-use, mostly in the eastern portion of the allotment); Tom Connolly (595 AUMs plus 25 AUMs suspended non-use, primarily in the extreme southwest portion of the allotment, with interchange with an additional allotment in Grass Valley); and the Dann sisters and Western Shoshone National Council (about 15,000 AUMs, primarily in Native pasture, without federal grazing permits or authorization).

Horses and burros. There are two wild horse herd areas in Lander County, but none in the Crescent Valley portion of Eureka County. The Dann sisters have about 800 horses. There have been infrequent reports of wild burros, south of the Town of Crescent Valley (McKenzie, 2001).

Scenic resources

A rhythmic pattern of isolated north-south trending mountain ranges and wide basins with broad, open vistas characterizes the scenery of the Great Basin. One sees vast areas of sagebrush and scattered grasses covering the valley basins, infrequent linear patterns of riparian willows and cottonwoods outlining the larger drainages, and--at higher elevations--mixed shrub and scattered pinon-juniper forests covering the mountains (USDOI, 1999).

Scenic resources in the general vicinity of the Crescent Valley that could be affected by the proposed rail corridor include: ranches; stage stops; hot springs; graveyards; historic mines; the Humboldt River; and various geologic formations (Eureka County, 2000). The Bureau of Land Management has classified the visual resource class of the corridor in Eureka County as a class IV (least value) (USDOE, 1999a).

C. The Human Environment

Cultural resources

The wide area surrounding the Crescent Valley, including Grass Valley, the northern Toiyabe Range, the Simpson Park Mountains, Beowawe, Battle Mountain, the Humboldt River, and beyond, comprises a prehistoric and ethnographic area of interest. The land that would be occupied by the proposed rail corridor falls within the traditional territory of the Western Shoshone, whose people refer to themselves as the "Newe" (USDOI, 1999).

Anthropologist Mary Rusco studied places important to Newe beliefs and practices at the north end of the Crescent Valley in the Beowawe area. She concluded there are two kinds of highly important areas for religious purposes: springs, and the most prominent land forms in the area. Other anthropologists have identified power spots that always include springs, mountains, and the tops of prominent, isolated rock formations. There is a traditional Newe concern for springs. "To-sam-boi" is the name given to the hot spring area at Beowawe by Newe elder Eunice Silva in 1997 (USDOI, 1999).

Western Shoshone tribes presently living in the general vicinity of the rail corridor include, from west to east, the Yomba Shoshone, the Duckwater Shoshone, and the Ely Shoshone. The Consolidated Group of Tribes and Organizations says that the proposed rail corridors pass through traditional holy lands of the Southern Paiute, and correspond or are adjacent to ancient pathways and trails (USDOE, 1999a).

Regarding European settlement of the general area around the Crescent Valley, the 19th century emigrant trail intersected the Humboldt River, west of Carlin and Emigrant Pass, at Gravelly Ford, about three miles east of the present site of Beowawe. (See Figure 5c.) The River had a solid gravel bottom there, where wagons could cross and reach excellent grasslands on the south side. The Whirlwind Valley (its present name), farther to the west, also provided a source of grass and springs. At Gravelly Ford, emigrant parties camped, before crossing the River to the south side or taking a route over bluffs north of the River, eventually reaching the River again, north of the present headquarters of the Horseshoe Ranch. Most parties took the easier trail on the south side.

The national wagon road, connecting Nebraska to California, followed the California Trail along the Humboldt River. The road was designated in 1856. In 1868, Beowawe and Carlin were founded on the line of the Central Pacific Railroad, the tracks for which were built along the Humboldt River route of the California trail (Thompson, 1987).

In the vicinity of Gravelly Ford is a cemetery, where Lucinda Duncan was buried in 1863. Crews working on the construction of the Central Pacific Railroad relocated the grave in 1869, and erected a large cross on the site. Subsequently, the fanciful legend of the "Maiden's Grave" grew regarding the site (The trail). Also, in Lander County, immediately adjacent to the Eureka County line, about three miles east of NV 306 in section 24, maps show a public lands cemetery (USDOI, 1999).

The Pony Express route crosses Eureka County from east to west, south of the Crescent Valley and north of the Town of Eureka. In 1860, a Pony Express station was established at a location known as Simpson Park. During the last few months of Pony Express operations and through most of the 1860s, the Overland Mail Company also used the Simpson Park station as a stagecoach stop (Godfrey, 1994). The site of Simpson Park is located in southeastern Lander County, south-southwest of the Town of Crescent Valley.

Population and demographics

According to the 2000 census, the current population of Eureka County is approximately 1,600 persons. The census reported 548 persons living in the Beowawe census county division (CCD) and 1,103 persons in the Eureka CCD. Whites make up the largest demographic group, accounting for 88 percent of the population in the Beowawe CCD and 89 percent in the Eureka CCD (USDOC, 2000a). The minority population does not appear to have increased since the 1990 census, which reported a minority population for Eureka County of 11 percent (USDOE, 1999a).

Looking at the last 20 years, the population of Eureka County increased 29 percent from 1980 to 1990 (changing from 1,198 to 1,547 residents). Growth slowed appreciably in the 1990 to 1997 period. The population of Beowawe declined by about 12 percent, to 51 residents, and the population of the Town of Crescent Valley declined about 10 percent, to 240 residents. However, another estimate placed the population of the town, in 1998, at between 500 and 600 residents (USDOI, 1999).

Growth rates for the County are expected to be less than Nevada's average. In 1998, Nevada's state demographer projected Eureka County's 2007 population at 2,250 persons (USDOI, 1999).

Land ownership

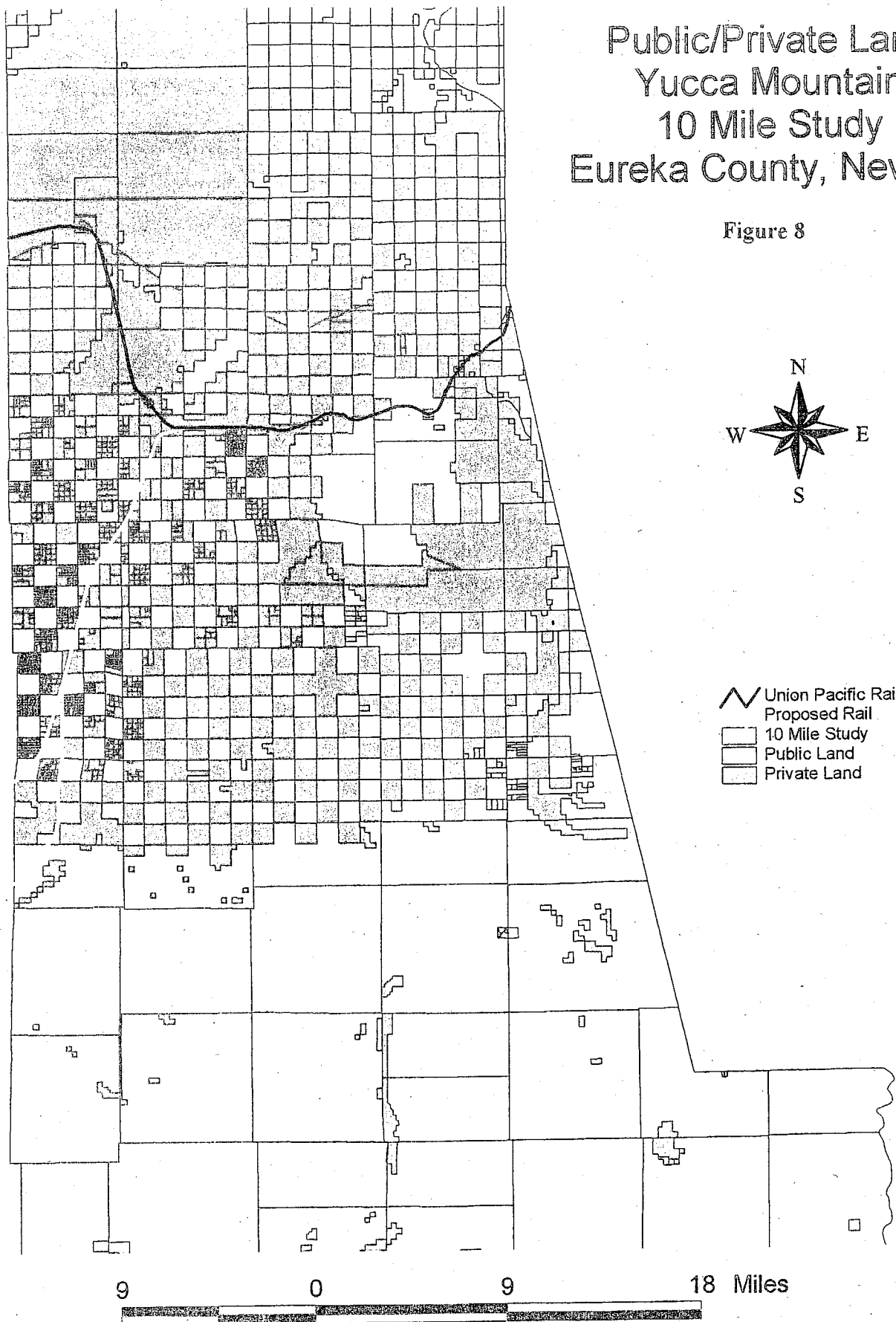
Although the percentage of private land within the proposed Carlin rail corridor is less than 4 percent, within Eureka County, the corridor includes about 54 percent private land (for the primary option) or 59 percent private land (for the Crescent Valley option) (R. Moore, pers. comm., 2001). Almost 60 percent of the assessed private parcels of land in Eureka County are within 10 miles of the proposed corridor, which would affect 1,730 acres of private land along its length (Eureka County, 2000). (See Figure 8, map of land ownership in northern Eureka County, and Figure 9, map of land ownership as affected by the rail corridor.)

Economy

Eureka County employment, as of 1997, consisted of 5,188 full-time and part-time jobs. Thus, there are about 3.1 jobs per resident. Personal income in 1997 was \$281.1 million by place of work, and \$40.7 million by place of residence. The labor force residing outside Eureka County represented 80 percent of the work force, 83 percent of the personal income, and 88 percent of wages and salary earned in 1997. Unemployment during the first quarter of 2001 was 2.7 percent (Fletcher, 2001).

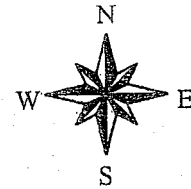
Public/Private Land Yucca Mountain 10 Mile Study Eureka County, Nevada





Figure 8



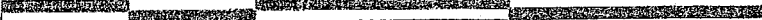
Yucca Mountain 10 Mile Study Area Eureka County, Nevada

Figure 9



-  Proposed RR
-  Union Pacific RR
-  10 mile study area
-  Parcel

8 0 8 16 Miles

A horizontal scale bar with alternating black and white segments. It is marked with '8', '0', '8', and '16 Miles'.

Gold mining is very important to Eureka County's economy. In 1996, mining accounted for 90.8 percent of total earnings, followed by earnings in construction and state and local government (USDOL, 1999). The County experienced a drop in total employment from 1990 to 1997, including a marked decrease during the 1993 to 1996 period, reflecting a slowdown in the mining industry. From 1990 to 1997, the unemployment rate varied between 4.2 percent and 10.90 percent. As of the first quarter of 1997, the largest employers in Eureka County were (USDOL, 1999):

- Newmont Gold Co. (2,200 to 2,299)
- Barrick Goldstrike Mines, Inc. (1,700 to 1,799)
- Eureka County (100 to 199)
- Newmont Exploration Ltd. (100-199)
- Eureka County School District (100-199)
- Mine Service and Supply Co., Inc. (less than 100)
- Stewart Brothers Drilling Co. (less than 100)
- Small Mine Development (less than 100)
- Nevada Department of Transportation (less than 100)
- Owl Club (less than 100)

As of 1999, Cortez Gold Mines, Inc. (CGM) had 456 employees at its location in Lander County, southwest of the Town of Crescent Valley. Of these employees, 94 resided in Crescent Valley and Beowawe (making up about 32 percent of the population), 62 in Battle Mountain, 51 in Carlin, and 249 in Elko and Spring Creek. During the life of its Pipeline project, the CGM work force is expected to fluctuate between 450 and 500 employees (USDOL, 1999).

Mining production is expected to decrease 25 percent in the next five years, 60 percent in the next 14 years, and 100 percent by 2018 unless new reserves are discovered, according to a study by the Center of Economic Development at the University of Nevada, Reno (Fletcher, 2001).

In addition to gold mining, agriculture provides a smaller but stable economic base over an extended time period. The agricultural economy consists of four sectors: range beef cattle, alfalfa hay, timothy hay, and native hay. Travel, including tourism and recreational travel, has been more important to the economy in recent years. Lodging, eating, drinking, and retail sales establishments provide enhanced services to local residents, due to outside money circulating through the local economy from visitors (Fletcher, 2001).

Housing

As of 2000, the federal census reported 1,025 housing units in Eureka County, of which 666 were occupied (491 by their owners and 175 by renters). There were 359 vacant units, according to the census, of which 64 were maintained for seasonal or recreational use. However, the Eureka County assessor reports that there are 920 housing units on the tax rolls, consisting of 236 single-family homes, 28 duplexes, 4 four-plexes, and 640 mobile homes. The assessor says there are only about 25 vacant units--10 in the north and 15 in the south, primarily near the Town of Eureka. The assessor's data may be more realistic than the U.S. census data, considering the County's stable population and low unemployment (Fletcher, 2001).

In the Crescent Valley and Beowawe area, there are no traditional hotels or motels. There are three recreational vehicle parks in the Crescent Valley, with a total of 60 spaces (USDOI 1999).

Mining and minerals

In the southern portion of the Crescent Valley and surrounding mountains, substantial mineral exploration and production of metallic and industrial minerals has occurred, and continues to occur. Gold and barite have dominated mineral production, but historical production includes silver, turquoise, and lesser amounts of copper, lead, and arsenic. (USDOI 1999, p. 4-4) Historic and existing mining projects in Eureka County, in the southern Crescent Valley, include the Mill Canyon gold mine (with 18 acres of surface disturbance) and the Hot Springs sulfur mine (with 5 acres of surface disturbance) (USDOI, 1999).

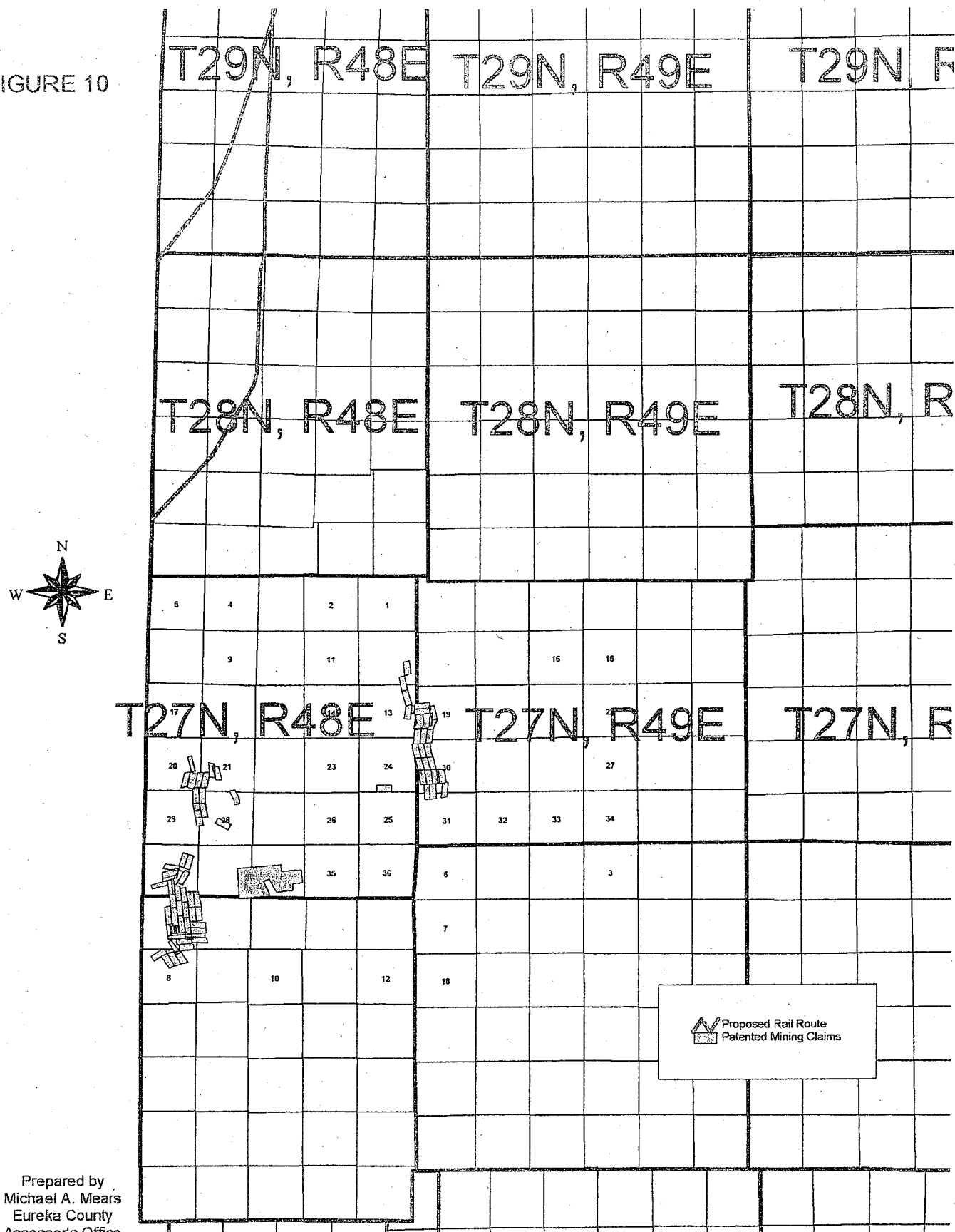
The Mill Canyon site was active prior to 1950 and was the subject of additional mineral exploration in 1988. The operations there resulted in some groundwater contamination. The Hot Springs sulfur mine is an inactive, historic open pit mine located near Hot Springs Point, east of the Town of Crescent Valley. It consists of roads, pits, dumps, and trenches (USDOI, 1999).

In the general vicinity of the southern Crescent Valley, mineral exploration in the next ten to 15 years may disturb up to 150 acres of land in the Cortez Range, up to 100 acres of land in the Toiyabe Range, up to 100 acres in the Shoshone Range, and about 150 acres in valley areas. Activity in the Cortez Range will focus on Horse Canyon, the Cortez trend, and the Buckhorn area (USDOI, 1999).

There are 92 patented mining claims in Eureka County within 10 miles of the proposed Carlin rail corridor and the existing UPRR tracks. Two patents are located near Carlin in T32N, R48E. The balance are south of the Town of Crescent Valley in T26N, R31E (31 patents); T26N, R49E (10 patents); T27N, R48E (23 patents); and T27N, R49E (26 patents). Numerous unpatented mining claims have also been recorded with Eureka County in various locations in the Crescent Valley (Mears, pers. comm., 2001). (See Figure 10, map of patented mining claims.)

Adjacent to the Eureka County-Lander County line in the southern Crescent Valley, Cortez Gold Mines, Inc. (CGM) operates mining and processing facilities in three main areas. The Cortez facilities are on the east side of the Crescent Valley, on the west flank of the Cortez mountains in Lander County, about six miles west of Horse Canyon. The Gold Acres/Pipeline facilities are on the southwest side of the Crescent Valley in the Shoshone Range, in Lander County, about eight miles northwest of the Cortez area. Finally, the Horse Canyon facilities are located about two miles east of Mount Tenabo in the Cortez Mountains, in Eureka County, and include the Horse Canyon Pit and a deposit known as the "south silicified zone". The company also operates the Cortez gravel pit, located on the south side of the Gold Acres haul road, about one mile west of the Cortez facilities. The gravel from the pit is used for concrete, road surfacing, and other construction and operational uses. The approved surface disturbance for the pit is about 100 acres, and 75,000 cubic yards of gravel may be used in a ten year period for CGM's Pipeline project (USDOI, 1999).

FIGURE 10



These various CGM facilities are located on the Battle Mountain-Eureka mineral trend, within a joint venture area established by Placer Dome U.S. and Kennecott Minerals (USDOI, 1999; *see also* mineral rights ownership map, this reference, Figure 1.2.1).

The Pipeline and South Pipeline projects of CGM are named after a water pipeline that crosses the area and supplies water to the Gold Acres operations. As of 1999, CGM was operating the Pipeline project at a rate of up to 250,000 tons/day, with plans to operate through 2004, and a proposal to expand with the South Pipeline project (consisting of both an expansion to the southeast and a water infiltration project), which would extend the life of the project by about 10 years. (USDOE, 1999a; USDOI, 1999).

Mineral exploration continues within the Pipeline/South Pipeline project area and in the vicinity of the Cortez open pit, where drilling has defined potential economic ore reserves. CGM is not backfilling the Cortez pit, due to the potential for economic mineralization nearby (USDOI, 1999).

Approved surface disturbance associated with CGM's Pipeline and Crescent waste rock dumps is about 667 and 114 acres, respectively, with a combined capacity to store about 250 million tons of waste rock. The height of the waste rock dump is up to 200 feet above grade (USDOI, 1999).

At the Pipeline mine site, dewatering operations pump groundwater at a maximum annual average rate of 30,000 gpm. Actual pumping rates are substantially lower than the maximum. Water is pumped from wells around the Pipeline open pit, and most is returned to the same groundwater basin (i.e., Basin No. 54, the Crescent Valley hydrographic basin) through a series of infiltration basins. Upon approval of the South Pipeline project, the maximum rate of groundwater pumping increased to 34,500 gpm (USDOI, 1999).

Infrastructure and public facilities

Aviation. Eureka County maintains a general aviation airport, east of the Town of Crescent Valley, and partially within the corridor of the proposed Carlin railroad line.

Energy. Sierra Pacific Power Company (SPP) provides electric power to CGM's Pipeline mine and process area via a 120 kilovolt transmission line from the Battle Mountain area. The line connects the Reese River substation in Battle Mountain to the Cortez Tap Switching Station in Whirlwind Valley, about 12 miles away. The line then proceeds 23 miles to the south to a substation at the Pipeline mill (USDOI, 1999). Duke Energy operates a bulk propane and oil dispensing facility in Beowawe. Propane and oil are stored for delivery to area residents and businesses through distributors (V. Drenon, pers. comm., 2001).

Government. The Board of Eureka County Commissioners oversees County government and administers the budgets of the Town of Eureka and the Town of Crescent Valley. Various special districts are governed by the Board of County Commissions or by separate boards. A town advisory board participates in governance for the Town of Crescent Valley, as set forth in State statutes.

Medical facilities. There is a medical clinic in the Town of Crescent Valley, but there are no health care facilities in Beowawe. Residents of and visitors to the affected area obtain most medical, dental, and pharmacy services in Ely, Elko, Reno, Battle Mountain, and Salt Lake City (USDOJ, 1999; A. Johnson, pers. comm., 2001). The nearest hospitals are Elko General Hospital and Battle Mountain General Hospital (Eureka County, 2000).

Parks. The Town of Crescent Valley includes a park with basketball and tennis courts, a picnic area, a ball field, and a playground. Fairgrounds for equestrian events are located adjacent to the Town. There is a playground at the Beowawe school building, which is used for community recreation.

Police, fire protection, and emergency response. Law enforcement services in Eureka County are provided by the Eureka County Sheriff and the Nevada Highway Patrol. There is a new fire station in a new building in Beowawe (Drenon, pers. comm., 2001). Nevada's rural areas have extremely limited (or no) capability for initial response to accidents involving spent nuclear fuel and high-level radioactive waste (Eureka County, 2000).

Railroads. The UPRR railroad track, which passes through Eureka County near the Humboldt River and Beowawe, is--in this location--an unusual double track. The tracks were originally single tracks owned by the UPRR and the SP. The single-track lines were operated jointly under a paired track agreement for approximately 180 miles, between Alazon (near Wells, NV) and Wescos (near Winnemucca, NV). The UPRR acquired the SP and now owns both sets of tracks (Moore, 2001a).

Westbound traffic uses the original SP track, and eastbound traffic uses the original UP track. Although the two tracks share right-of-way in some locations, they are in separate rights-of-way for most of the distance between Wells and Winnemucca, sometimes separated by as much as four miles. In the vicinity of Beowawe, the eastbound track is the southern track. Trains operate under automatic block signal control, and are not controlled directly by dispatchers. Most passing sidings have been removed. Crew change points are at Elko, NV, and Carlin, NV. Traffic on the paired UP and SP tracks is heavy, at about 30 trains per day (Moore, 2001a).

An intermodal (rail-to-truck) freight transfer facility has been constructed on the existing UPRR line at Dunphy, about 10 miles north of Beowawe. Owners of mines in Eureka County are considering construction at this site of a facility to produce ethanol for use as fuel (Hutchings, pers. comm., 2001).

Schools and libraries. The Eureka County School District (ECSD) operates a junior-senior high school with a capacity of 200 students; an elementary school with a capacity of 240 students; the Crescent Valley elementary school, with a capacity of 180 students; and 12 school buses. The Great Basin Community College offers classes for adults (USDOJ, 1999). Current enrollment at the Crescent Valley Elementary School, located at 444 4th Street in the Town of Crescent Valley, is about 60 students in grades K through 6 (CVES, undated). The school building in Beowawe is not used for classes, since students from Beowawe attend school in the Town of Crescent Valley, but the building is used as a recreation center, maintained by Eureka County's juvenile probation

office. The building provides basketball courts and other recreation activities for adults and children (Drenon, pers. comm., 2001).

A multi-county library district for Elko, Eureka, and Lander counties operates libraries in both the Town of Crescent Valley and Beowawe.

Social services. Eureka County operates a senior center for the Crescent Valley area, with a staff of 4 persons, serving lunch to 25 to 30 persons per day. The center also assists persons with access to social services.

Solid waste. Hoss Disposal collects solid waste from the Town of Crescent Valley and transports it to the Eureka landfill. The landfill, which is owned and operated by Eureka County, is a Class II municipal landfill. According to County records for the second quarter of 2001, the average total tonnage received by the landfill was 133 tons per month; the facility has enough remaining capacity for 30 years.

At CGM's Cortez and Pipeline project areas, all trash and refuse is hauled to an approved Class III-waivered landfill located on private land in the project area (USDOI, 1999).

Streets, roads, and highways. Interstate 80, Nevada 278, Nevada 306, and U.S. 50 are the main improved roads in Eureka County. These are important routes for mining, commerce, and the mobility of residents and visitors. A network of County roads provides access to public lands, private property, and mining claims (Eureka County, 2000). Nevada 306 is the principal access road through the Crescent Valley from Beowawe to the CGM mine projects. The road terminates at the junction with Lander County 225, in the vicinity of the Pipeline project (USDOI, 1999). (See Figures 5A, 5B, and 5C, location maps.) There is a County yard at Beowawe.

Wastewater. Sewage disposal in the Crescent Valley, including Beowawe and the Town of Crescent Valley, occurs through private septic systems.

Water. Eureka County supplies water to about 247 customers of the Crescent Valley water system. The County maintains 3 wells, a distribution system, and three storage tanks with a total capacity of 660,000 gallons. The balance of residents and visitors to the Crescent Valley rely on wells and surface springs for water (Drenon, pers. comm., 2001; USDOI, 1999). Most of the wells and springs north of the Town of Crescent Valley are located between Nevada 306 and the proposed rail line right-of-way. There are also a number of flowing wells south of the Town, most of which are located in the area between the primary corridor and the alternative corridor to the east (Moore, 2001b). Potable water at CGM's Pipeline project and Cortez facilities is provided by bottled water or a fresh water supply well (USDOI, 1999).

Public finance

The costs of operating government and schools in Eureka County are paid for through a variety of taxes and fees, collected either at the State level (for distribution to the County) or at the County level. Taxes and fees collected by the County, and by the State of Nevada for distribution to the County, include (Nevada Taxpayers Association, 1999):

- Cigarette and other tobacco products excise tax (set at 10 cents per package of 20 cigarettes, less an administrative fee, deposited in the local government tax distribution fund and redistributed within each county by statutory formula);
- City-county gaming tax (charged at a flat rate per machine and per game, for the general fund of the local government);
- Combined sales and use tax (levied on the retail sale of tangible personal property for use or consumption, plus equipment leases and rentals, including the State sales and use tax (SST), the local school support tax (LSST), the basic city county relief tax (BCCRT), the supplemental city county relief tax (SCCRT), and county optional sales taxes, and distributed to the State general fund, school districts and local governments);
- County gaming fees (charged on card games, other games, and slots at \$25, \$50, and \$10 per month respectively, to the county general fund, from which a portion is distributed to cities and unincorporated towns);
- County motor vehicle fuel tax (set at 1 cent per gallon, used only for repair and restoration of existing paved roads and streets owned by the county);
- County RTC motor vehicle fuel tax (set, in Eureka County, at 4 cents per gallon of motor vehicle fuel sold, to the regional highway fund for construction or improvements);
- Intoxicating liquor tax (liquor over 22 percent alcohol is taxed at \$2.05 per gallon, of which 50 cents is deposited in the local government tax distribution fund and redistributed within each county by statutory formula);
- Local franchise fee (imposed by ordinance on public utilities, including local governments, that provide electrical energy, natural gas, or telecommunications; collected from utility customers; limited to a maximum of 5 percent of the utility's gross revenue);
- Local transient lodging tax (levied in Eureka County at 8 percent on revenues from the rental of transient lodging);
- Motor vehicle privilege tax, basic (a tax of 4 or 5 cents on each \$1 valuation of a vehicle, plus taxes on trailers and other vehicles, distributed to the state highway fund, schools, and the local government tax distribution fund for distribution by statutory formula);

- Net proceeds of minerals and patented mines tax (received by counties, cities, towns, school districts, and special districts based on their tax rate times net proceeds; covers both real property of patented mines and proceeds of patented and unpatented mines; includes royalties; set at a rate between 2 and 5 percent, depending on the ratio of net proceeds to gross proceeds);
- Personal property tax (on business personal property, mobile and manufactured homes not converted to real property, leasehold improvements, and non-licensed vehicles, at the same rate and distributed in the same manner as taxes on real property);
- Real property (ad valorem) tax (set at a rate per \$100 of assessed valuation, to a statutory maximum of \$3.64, including a state rate of 15 cents, a school operating rate of 75 cents, and a variable school debt rate, and distributed to the State, cities, towns, counties, school districts, general improvement districts, and special districts);
- Real property transfer tax (levied on the value of real property transferred from one person to another, at 65 cents per \$500 of value, of which 55 cents goes to the local government tax distribution fund for redistribution by statutory formula);
- Slot machine excise tax (a statewide annual tax of \$250 per machine, a portion of which goes to the State Distributive School Fund);
- State games license, annual fees (an annual fee on all games, distributed among the 17 counties, less the cost of administration, to the county general fund);
- State motor vehicle fuel tax (set at 23 cents per gallon, of which 5.35 cents is distributed to county road funds);
- State transient lodging tax (8 percent, levied by the State on revenues from rental of transient housing, in addition to any locally-imposed room tax, and distributed to counties or fair and recreation boards for the promotion of tourism or to furnish recreation facilities); and
- Miscellaneous local levies.

For Fiscal Year 1999-2000, Eureka County's total budget was \$11.6 million. The two largest revenue sources were property taxes including net proceeds of mines (\$4.4 million) and intergovernmental receipts (\$5.3 million). Total projected budgets for Fiscal Years 2000-2001 and 2001-2002 were smaller, at \$10.5 million and \$8.5 million, respectively. The volatility in the County's budget is largely due to fluctuations in mining activity.

The Eureka County School District is a separate unit of government, with a separate budget.

Outdoor recreation

In the general vicinity of the Crescent Valley, dispersed outdoor recreation is the predominant type of recreation. Residents of Eureka County, as well as residents of other parts of Nevada and

other states, rely on open spaces in Eureka County for recreational opportunities, including camping, hiking, hunting, fishing, nature study, history study, photography, rock hounding, OHV use, mountain biking, back country travel, horse packing, cross-country skiing, snowmobiling, picnicking, and sightseeing. Photographing the Cortez historic structures is a popular activity. The Roberts Wilderness Study Area (WSA) in west-central Eureka County (about 50 miles south-southeast of the Town of Crescent Valley) and the Simpson Park WSA in southeastern Lander County (about 60 miles south-southwest of the Town of Crescent Valley) are used for hunting, hiking, and camping (Eureka County, 2000; USDOl, 1999).

In this general area of Nevada, demand for developed recreation facilities exceeds supply, and recreation shortfalls have occurred or are projected for: stream fishing, skiing, tennis, bicycle trails, backpacking trails, ball fields, tent camping sites, and picnic spots (USDOl, 1999).

Hunting and fishing are popular outdoor recreation activities in this area. Species hunted in the general Crescent Valley region and surrounding area include mule deer, antelope, mountain lion, sage grouse, chukar, cottontail rabbit, quail, pigeon, dove, and waterfowl (USDOl, 1999). About 600 big game tags are issued by NDOW each year for the area in and around northern Eureka County (Johnson, pers. comm., 2001).

According to the Nevada Division of Wildlife (NDOW), the Crescent Valley, south of the Humboldt River and east of Nevada 306, plus the Cortez Mountains, makes up Nevada Hunt Unit No. 141, in NDOW's area 14. The portion of the Crescent Valley and adjacent mountains to the west of Nevada 306 is in the northeast corner of Hunt Unit No. 152, in area 15 (NDOW, 2001a). The State of Nevada establishes annual hunting seasons (generally from the late summer through the fall) and quotas for these two units for antelope (horns longer than ears) and mule deer (antlered and antlerless) (NDOW, 2001b).

From 1990 to 1999, an average of 334 anglers fished 2,293 days and caught 9,227 fish per year in Eureka County, according to questionnaires returned to NDOW. Waters fished include, among others, Frenchie Creek, the Humboldt River, and the Barth Pit, which is the most popular fishing spot (NDOW, 2001c).

Except within the WSAs, where motor vehicle use is limited to existing travel routes, there are no off-road vehicle use restrictions within the BLM's Battle Mountain field office's area (USDOl, 1999).

Public health and the quality of life

The unique values of such communities as the Town of Crescent Valley and its surroundings include: clean air, access to open space and recreation, activity and passive enjoyment of fish and wildlife, quiet surroundings, enjoyment of nature, views and scenery, the community life of a small town, safety and security, agricultural and other outdoor employment, and others.

Eureka County is downwind of, and a recipient of fallout from, the Atomic Energy Commission's above-ground nuclear weapons tests, which exposed Eureka County residents to radioactivity (Eureka County, 2000). The first atmospheric nuclear test, named "Able," was

detonated at the Nevada Proving Ground (renamed the Test Site in the early 1960s) on January 27, 1951. The parachute-carried atomic weapon was dropped from an airplane. Four additional tests occurred in the next few weeks. The initial nuclear and atomic tests at the Proving Ground were conducted in the atmosphere and detonated on towers, on balloons, or after being dropped from airplanes. There were annual test series; the tests became routine. "Many longtime Nevadans remember sitting on their front lawns in the predawn hours to witness the brilliant light that would turn night into day when a test was detonated." In 1963, the United States and the U.S.S.R. signed the Limited Test Ban Treaty, which prohibited testing in the atmosphere, underwater, and in space (Wade, 2001).

D. The Regulatory Environment

Construction and operation of the proposed Carlin rail corridor would take place in a complex regulatory environment with federal, state, and local components. For example, the proposed action could require, without limitation: (1) a federal Clean Water Act Section 404 permit, issued by the U.S. Army Corps of Engineers for any dredging or filling or wetlands or waters of the United States, (2) an air quality permit to operate, issued by Nevada's Division of Environmental Protection (NDEP), (3) a water pollution control permit from NDEP, (4) a reclamation permit from NDEP, (5) a permit to appropriate water, from Nevada's Division of Water Resources, (6) an application to NDEP to operate a sanitary landfill, (7) a general stormwater discharge permit from NDEP, (7) road rerouting applications to the BLM, and (8) hazardous material storage permits from the State Fire Marshal (USDOJ, 1999).

Applicable federal laws, regulations, and policies include:

- Section 8 of Chapter 262, 14 Statutes 253 (former 43 USC Section 932, commonly referred to as R.S. 2477), enacted in 1966, preserving access to rights-of-way over public lands for fire control, law enforcement, search and rescue, medical personnel, public utilities, and members of the general public, and subject to enforcement by Nevada's Attorney General pursuant to subsection 1 of *Nevada Revised Statutes* (NRS) 405.204 (Eureka County, 2000);
- The General Mining Law of 1872, under which the BLM administers mineral rights access on certain federal lands, and under which qualified prospectors are entitled to reasonable access to mineral deposits on public domain lands that have not been withdrawn from mineral entry (USDOJ, 1999);
- The federal Clean Air Act and Clean Water Act and their implementing regulations, largely implemented by NDEP (USDOJ, 1999), including the Clean Air Act's requirements regarding prevention of significant deterioration (PSD) outside nonattainment areas;
- The federal land management act known as FLPMA and corresponding federal regulations, under which the BLM manages public lands to protect and inventory fossil resources and for numerous other purposes (USDOJ, 1999);

- The Emergency Planning and Community Right-to-Know Act (1986), also known as SARA Title III, and related laws that establish requirements for federal, state, and local governments and industry regarding emergency planning and community reporting on hazardous and toxic chemicals;
- The American Indian Religious Freedom Act (1978), Executive Order 13007 (1996) regarding Indian sacred sites, the Native American Graves Protection and Repatriation Act (1990, as amended), and the National Historical Protection Act (1966, as amended) and its implementing regulations, including section 106 (USDOJ, 1999);
- The federal Wild and Free-Roaming Horse and Burro Act; the Migratory Bird Treaty Act; the Bald Eagle Protection Act; and the federal Endangered Species Act (USDOJ, 1999);
- The federal Noxious Weed Act (1974) as amended by Section 15 of the Management of Undesirable Plants on Federal Lands (1990), which authorizes the Secretary of the Interior to cooperate with federal and state agencies to eradicate, suppress, control, prevent, or retard the spread of noxious weeds, as well as BLM policies and cooperative agreements implementing these laws (USDOJ, 1999);
- BLM regulations for surface management of public lands mined under the general mining law (43 CFR 3809), which recognize the statutory right of mineral claim holders to explore for and develop federal mineral resources, and which encourage such development (USDOJ, 1999); and
- The Shoshone-Eureka Resource Management Plan (RMP) of the BLM's Battle Mountain field office, which provides that all public lands in the planning area will be open for mining and prospecting unless withdrawn or restricted for mineral entry, and which recognizes these areas as having a highest and best use for mineral production (USDOJ, 1999).

Applicable state laws, regulations, and policies include, without limitation (USDOJ, 1999):

- Nevada's statewide comprehensive outdoor recreation plan (SCORP), which defines outdoor recreation, conservation, and open space needs and describes statewide recreation issues and strategies for federal, state, local, and private providers, and which is required for eligibility for federal land and water conservation fund programs;
- Noxious weed control provisions found in Chapter 555 of NRS and Chapter 555 of the *Nevada Administrative Code* (NAC);
- Air pollution control regulations found in Chapter 445B of NAC;
- State laws regarding water rights, administered by the State Engineer's Office in Nevada's Division of Water Resources; and
- State regulations regarding pit lakes that have the potential to degrade the waters of the State, in Chapter 445A of NAC.

At a regional level, the five-county Humboldt River Basin Water Authority, which includes Elko, Eureka, Lander, Humboldt, and Pershing counties, reviews development and addresses concerns with water use and impacts on the Humboldt River. Two representatives from the Board of Eureka County Commissioners sit on the Authority.

Finally, applicable Eureka County policies include the Eureka County master plan (January 1997) and its land use element (July 1998), which identify issues of concern including: (1) protection of private property rights and value of land assets, (2) fiscal, agricultural, and groundwater impacts from parcelization of land, and (3) the need to acquire land from the BLM for community expansion, to increase the amount of private land, and to ease restrictions on the use of federal land (Eureka County, 2000).

Under various Executive Orders (EOs) issued by the President of the United States, all federal agencies are required to abide by state and local regulations that protect the environment. Applicable orders include EO 12088 (October 13, 1978; 43 CFR 47707) and EO 13148 (April 21, 2000).

FINAL
August 2001

Part 4:

ANTICIPATED IMPACTS OF THE PROPOSED ACTION IN EUREKA COUNTY, NEVADA

A. The Natural Environment

Environmental impacts, generally

A complete assessment of the impacts of the proposed action, particularly the rail line, is not possible until the DOE provides more detailed information on construction and operations. (Moore, 2001b) The DEIS for the proposed geologic repository (USDOE, 1999a, p. 2-49) says:

Construction activities would include the development of construction support areas; construction of access roads to the rail line initiation points and to major structures to be built, such as bridges; and movement of equipment to the construction initiation points. The number and location of construction initiation points would be based on such variables as the route selected, the length of the line, the construction schedule, the number of contractors used for construction, the number of structures to be built, and the locations of existing access roads adjacent to the rail line.

The assessment of impacts performed by the DOE (1999a) was limited mainly to anticipated impacts within a set distance of the identified rail corridors. However, railroad yards, borrow areas, areas for disposal of surplus fill, staging areas, access roads to construction initiation points, and other construction activities will result in impacts outside the identified corridors. Such activities are poorly defined, and will occur where no environmental baseline data have been collected (Moore, 2001b).

The remainder of this part of the impact assessment report addresses the anticipated impacts of "accident-free" transportation of spent nuclear fuel (SNF) and high-level radioactive waste (HLW), as well as the impacts of a transportation accident. In this context, "accident" means a transportation incident in which a SNF or HLW shipping cask hits the ground, either by rolling off a truck or rail car, or by the truck or rail car overturning. "Severe accident" means a transportation incident in which a damaged shipping cask releases radioactivity into the environment.

Hydrology and water resources

Impacts of accident-free rail transportation. Where the corridor crosses the area of the 100-year flood, as mapped by FEMA (1998), the Carlin railroad spur would be vulnerable to damage and or inundation for approximately eight miles or more between Beowawe and the Town of

Crescent Valley, and also to the southeast of the town along Thomas Creek. Construction of the rail spur and access roads may change the boundaries of flood areas, subjecting new properties to flooding, flood damage, and higher insurance costs. This impact would be most prevalent on the upgradient side of the proposed alignment or other flow obstruction. (See flood plain map, Figure 2.)

The DOE says (1999a) that a storm or runoff event greater than the 100-year storm may wash out access roads or the rail line, and that operations would stop during potential flooding conditions or during repairs. (The DOE assumes, apparently, that shippers of SNF and HLW can anticipate floods and adjust accordingly.) A flood-related disruption of the shipping campaign would expose workers and County residents to radioactivity from parked or stalled shipments, or from any legal-weight trucks that take the place of rail cars during an extended period of flood damage repair.

Surface water contaminants that would probably be released during the construction phase include petroleum products (fuel and lubricants) and coolants (antifreeze), and there is a potential for releases from storage at work camps, supply trucks, and removal trucks (USDOE, 1999a). Potential releases during rail line construction also include waste oils and grease, PCBs, releases from vessel cleanouts, empty and crushed drums, sanitary wastes, drilling fluids and muds, solid wastes, construction wastes, and tires. Whether these contaminants would reach surface waters depends on the location of their release; certainly the Humboldt River and all streams and springs in the vicinity of construction activities would potentially be affected. (Contaminants spilled on the ground would eventually reach groundwater or surface water, unless they became bound to soil particles. Certain contaminants, such as solvents, are very mobile in most soils.)

To the extent that water wells are installed during the construction phase, withdrawals of groundwater could affect flows in nearby streams and springs, including the Humboldt River. The DOE (1999a) identifies these additional impacts of the Carlin rail spur: changes in the infiltration rate; introduction of new sources of contamination; and depletion of groundwater from increased demand.

Any waste rock piles that are created by the proposed action have the potential for acid rock drainage (ARD) and associated effects on water resources. To avoid impacts, the waste rock should be evaluated with acid-base accounting, and the acid generating potential (AGP) of waste rock should be monitored during excavation and disposal. Because the Crescent Valley receives an annual average of less than ten inches of precipitation, the amount of water available to cause ARD is low. (See USDOJ, 1999.)

Until additional information becomes available regarding the construction of the proposed rail line, specifically regarding cuts, fills, and borrow areas and the reclamation plans for such areas, it is assumed that they will also have surface water impacts in addition to those impacts already discussed in these paragraphs.

Impacts of accident-free truck transportation. Accident-free transportation of SNF and HLW through Eureka County by legal-weight truck would create a potential impact on water resources from the release of water pollutants in truck emissions during routine operations. If such

transportation required the construction of facilities, that construction would also create a potential impact on water resources from soil erosion during construction and the release of contaminants during construction and operation.

Impacts of a transportation accident. A transportation accident involving shipments of SNF and HLW through Eureka County would have a large potential impact on water resources. In an accident with no discharge of radioactivity, there would still be a risk of fuel spills, as well as damage to water resources from personnel and equipment responding to the accident. All accidents would also create a risk of wildfire, which would also have potential impacts on water resources.

In a severe accident with a release of radioactivity, there would be a possibility of a profound impact on the Humboldt River or the aquifer of the Crescent Valley, with long-term and widespread effects.

Air resources

Impacts of accident-free rail transportation. During the construction phase of the proposed action, the combustion of diesel fuel in haul trucks and mobile equipment (such as loaders and bulldozers), along with any combustion of propane and fuel oil, would create elevated ambient levels of carbon monoxide, particulate matter, oxides of nitrogen, and sulfur dioxide in the air. Combustion emissions from construction equipment are relatively uncontrolled at the exhaust pipe. (See USDO, 1999.) The DOE says (1999a) that construction of the branch rail line could temporarily increase pollutant concentrations due to fuel use by construction equipment and fugitive dust from excavation and truck traffic. Construction of the rail line would also result in the loss of soil through wind erosion, with associated air quality impacts (Moore, 2001b).

For the air quality analysis of Cortez Gold Mines' South Pipeline Project (in USDO, 1999), the following sensitive air quality receptors were identified: Filippini Ranch, Tenabo Ranch, Wintle Ranch, Dean Ranch, Dann Ranch, Crescent Valley School, Beowawe School, and the Jarbidge Wilderness. Presumably, these same receptors would be affected by air pollution from the proposed action, as would the Crescent Valley Clinic and other locations.

During the operations phase of the proposed action, vehicle emissions from train locomotives, employees' personal vehicles, and other vehicles would constitute additional sources of air pollutants, including carbon monoxide, oxides of nitrogen, sulfur dioxide, particulate matter, and other constituents of gasoline and diesel fuel exhausts.

According to the DOE (1999a), the construction of the proposed action would comply with all applicable air quality regulations. Nevertheless, the proposed action would diminish existing air quality, and reduce visual range in Eureka County and downwind areas by adding particulate matter and other light-scattering or light-absorbing pollutants to the air.

At this time, Eureka County does not know how the proposed action would be affected by the prevention of significant deterioration (PSD) requirements of the federal Clean Air Act. If the construction or expansion of a large stationary source of air pollution triggered the PSD

requirements in the Crescent Valley Air Basin, the proposed action could, in effect, compete with other sources for authority to discharge particulate matter or other pollutants. Such a scenario could cause problems for existing industries, and complicate economic development.

Impacts of accident-free truck transportation. During shipments of SNF and HLW through Eureka County by legal-weight truck, engine exhaust gases from the trucks would constitute an additional source of air pollutants, including carbon monoxide, oxides of nitrogen, sulfur dioxide, particulate matter, and other constituents of diesel fuel exhausts.

Impacts of a transportation accident. A severe accident involving the release of radioactivity from a shipment of SNF or HLW in Eureka County has a potential for creating a catastrophic air pollution episode, probably of short duration, but resulting in fatalities or other serious human health effects. Depending upon its location, such an episode could affect a large number of persons and animals downwind from the accident. All accidents, regardless of severity, also create risks of air pollution from fire, wildfire, land disturbance resulting in wind erosion, and other factors.

Vegetation and soils

Impacts of accident-free rail transportation. The proposed action would result in the disturbance of as much as 1,000 acres of vegetation and soils in Eureka County, including the railroad bed, access roads, work camps, the Beowawe facilities, and other areas.

The flat cross-sections of the rail corridor largely eliminate the need for cuts, but create a significant demand for borrow material to construct the road bed. Construction of the road bed in Eureka County would require 1.6 million cubic yards of fill material in excess of that generated by required cuts. Based on the DOE's assumptions that borrow material will be obtained from adjoining areas and that those areas will be excavated to a depth of 20 feet, more than 49 acres of borrow area will be required in the County (Moore, 2001b).

The depth to groundwater in much of the Crescent Valley is 15 to 20 feet. Since fill material must not be saturated with water, excavation of borrow pits below the water table is unlikely. Therefore, the probable result is an even greater area of surface disturbance in order to obtain required fill. In addition, the DOE would probably be required to construct a landfill for solid waste generated during construction of the rail line, and this requirement would again increase the amount of land disturbed by the project (Moore, 2001b).

It is not known at this time whether, and to what extent, the proposed action would affect identified sensitive plant species.

In terms of vegetation generally, the proposed action would normally result in a conversion from a shrub-dominated community to a community of grasses and other low-growing plants in the short term. Once established, shrub species would become dominant in three to five years, but 15 to 20 years would be required to establish mature shrubs.

The reclaimed plant community would be expected to stabilize the construction site and to provide forage for wildlife and livestock in the short term. However, the extensive proposed land disturbance would produce habitat conducive to invasion by noxious weeds, and vehicles used during both construction and operations would help spread weed seeds. Weed species rapidly invade disturbed areas, and initially hinder establishment of more desirable perennial plants, by outcompeting them for moisture. Noxious weeds are typically very aggressive, and have the ability to dominate sites, creating dramatic impacts to native plants and decreasing forage for livestock and wildlife. (See USDOl, 1999.)

According to BLM policies, a project is considered to have a significant effect on noxious weed management if it results in: (1) an increased likelihood of noxious weed species being introduced into a relatively weed-free area at moderate or high ecological risk, or (2) an expansion of noxious weed infestation inside and outside the project area into relatively weed-free areas a high or moderate risk. (See USDOl, 1999.)

Construction of the proposed rail line would also result in a loss of soil through wind erosion (Moore, 2001b) and water erosion, as well as a loss of infiltration capacity through compaction.

Impacts of accident-free truck transportation. The transport of SNF and HLW through Eureka County by legal-weight truck would create a potential impact on vegetation from the spread of noxious weeds, since motor vehicles are one means by which noxious weed seeds are spread.

Impacts of a transportation accident. An accident involving a shipment of SNF or HLW through Eureka County would also increase the risk of spreading noxious weeds, due to the operations of emergency vehicles and personnel, and also the creation of newly disturbed soils, which are vulnerable to weed invasions. Such an accident also would create a risk of wildfire, with associated impacts upon vegetation and soils. A severe accident involving a release of radioactivity would create a need to remove contaminated soils, possibly in large quantities, as well as a risk of soil disturbance during the emergency response period. These impacts, in turn, would create a risk of soil erosion and the spread of noxious weeds.

Wildlife and fish

Impacts of accident-free rail transportation. In general, impacts to fish and wildlife of the construction and operation of the proposed rail corridor would result from the removal of wildlife habitat, structural modification to wildlife habitat, and noise. (See USDOl, 1999.) Also, without undisturbed access to critical habitat, wildlife may abandon large areas of year-round habitat. Loss of wildlife habitat is not limited to physical loss due to rail line construction. Operation of the rail line would reduce the value of habitat crossed by, or near to, the line. Human activity (such as operating trains) in or near critical habitat can seriously degrade the value of that habitat for wildlife, especially for linear facilities that pass through habitat areas (Moore, 2001b).

Throughout the Crescent Valley, any fencing of the right-of-way would adversely affect the movement of pronghorn antelope. Linear facilities, such as a rail line, affect pronghorn by blocking their migration paths, particularly when rights-of-way are fenced. Pronghorn rarely

jump a fence, but rather go under fences. Therefore, the type of fencing used would be critical to pronghorn, and at least 18 inches of clearance above the ground is recommended (Moore, 2001b).

As the proposed rail corridor crosses the Toiyabe Range at Dry Canyon Summit, it would, if fenced, create an impediment to the movement of mule deer, as well as a danger of entrapment (McKenzie, pers. comm., 2001). Year-round deer habitat in the vicinity of Beowawe may suffer similar impacts.

Although the proposed rail line would not cross the sage grouse strutting ground located southeast of Beowawe, it would be close enough that construction and operation of the rail line would adversely affect the use of the strutting ground. Also, the strutting ground lies within an area that could be used for facilities required at the interconnection point with the UPRR (Moore, 2001b).

It is not known at this time whether, and to what extent, the proposed action would affect other sensitive species of wildlife. According to the DOE (1999a), construction activities in areas designated as game habitat by the BLM and NDOW would result in loss of habitat, and construction of the rail line could lead to habitat loss and fragmentation for special status species, as well as individual mortality. Such impacts would constitute a take under the federal Endangered Species Act. The DOE says (1999a) that fences, where constructed, *will* accommodate movement of game animals. Elsewhere in the same document, the DOE says that fences would not be likely to affect the movement of mule deer and elk, but may impede movement of antelope, mountain sheep, horses, and burros, and may divide management areas for these species.

The potential impacts on water resources, described earlier, may have adverse effects on brook trout and brown trout residing in streams in the Crescent Valley area.

Impacts of accident-free truck transportation. Shipments of SNF and HLW through Eureka County by legal-weight truck would create potential impacts on fish and wildlife through the release of environmental contaminants in motor vehicle exhausts, the possible spread of noxious weeds, and wildlife mortality resulting from collisions with trucks and escort vehicles.

Impacts of a transportation accident. An accident involving a shipment of SNF or HLW through Eureka County would create a potential impact on fish and wildlife from loss of habitat, through wildfire, ground disturbance, contamination, or a combination. The loss of habitat could be temporary or, in the case of severe accident, permanent. In a severe accident involving the release of radioactivity, direct mortality could occur to birds or fish in the immediate vicinity.

Range resources

Impacts of rail transportation. Construction of the railroad bed, access roads, cuts, and fills would destroy forage used by cattle and other animals. For the railroad bed itself, the width of disturbance would be about 200 feet during construction and, due to possible problems with reclamation and invasion by noxious weeds, 200 feet should be considered the width of long-

term disturbance. If the railroad bed right-of-way is not fenced, individual animals would hesitate or refuse to cross the tracks, and the management of livestock would be complicated by herding problems and interference with such operations as salting and facility maintenance. A reduction in available AUMs of 0.1 percent is assumed, to reflect the effect on management, unless special circumstances exist in a specific allotment or field (McKenzie, 2001).

If the railroad bed right-of-way is fenced, the fencing could reduce or prevent access to important sources of stock water, which would reduce or eliminate the usefulness of a portion of an allotment. Fencing could also isolate an area of grazing land, making it unusable by the present operator, and causing additional reductions in available AUMs (McKenzie, 2001). For purposes of this report, a fenced construction and buffer area 400 feet wide is assumed.

Railroads typically use box culverts to provide underpasses for movement of livestock and equipment under their tracks. Possible locations for these underpasses are highly dependent on terrain, since the required height can often be provided by natural drainage ways. However, the level terrain of the Crescent Valley suggests there will be little or no opportunity for this use of box culverts (Moore, 2001b).

Members of the public in the Crescent Valley have reported problems with damage to fences by the actions of public and private parties. Construction of the proposed rail line would clearly cause damage to existing fences, which may or may not be repaired by the project proponent.

Specifically regarding the Geyser allotment (see Figure 7), Zeda, Inc., would be the only operator affected by the proposed action, under present arrangements. The railroad bed would run about 13 miles south from the north boundary of the allotment, at the UPRR, to a point about 1.5 miles east of the Town of Crescent Valley, where it would leave the allotment. Forage production is low on most of the land directly affected. If the ROW were unfenced, forage would be destroyed or become unavailable on about 317 acres. The reduction in available AUM would be about 0.4 percent or 13 AUM, due to the loss of forage and interference with operations. If the ROW were fenced, forage would be destroyed or become unavailable on about 633 acres. The reduction in available AUM would be about 10.6 percent or 331 AUM, due to the loss of forage, the isolation of the eastern third of the allotment, and loss of access to water sources (McKenzie, 2001; Moore, 2001b).

Regarding the South Buckhorn allotment (see Figure 7), the railroad bed would enter the allotment in the Native Pasture about 1.5 miles east of the Town of Crescent Valley. The primary alignment would pass through the east fence into Gravel Pasture, then exit the pasture, the allotment, and the County about five miles south of the Town. The alternative alignment would pass through the south fence into the Dean Pasture, and exit the pasture, allotment, and County about 10 miles south of the Town (McKenzie, 2001).

If the primary alignment were selected and the ROW unfenced, forage would be destroyed or become unavailable on about 44 acres in the Native Pasture and 119 acres in the Gravel Pasture. The resulting reduction in AUMs in the South Buckhorn allotment would be about 0.02 percent (5 AUM) on the Native Pasture and 2.4 percent (2 AUM) on the Gravel Pasture, due to construction impacts, isolation of water sources, and interference with operations. If the ROW

were fenced, the reduction in available AUM would be about 81 AUM, due to splitting the Gravel Pasture into two fields, one without water (McKenzie, 2001; Moore, 2001b).

If the alternative alignment were selected and the ROW unfenced, forage would be destroyed or become unavailable on about 163 acres in the Native Pasture and 119 acres in the Dean Fenced Federal Pasture. The resulting reduction in AUMs in the South Buckhorn allotment would be about 0.09 percent (20 AUM) on the Native Pasture and 1.1 percent (5 AUM) in Dean Fenced Federal Pasture, due to the loss of forage from construction. If the ROW were fenced, forage would be destroyed or become unavailable on about 327 acres in the Native Pasture and 238 acres in the Dean Fenced Federal Pasture. The reduction in available AUM would be about 0.16 percent or 41 AUM in Native Pasture and 12.1 percent (54 AUM) in Dean Fenced Federal Pasture, due to the loss of forage plus splitting the Dean pasture into two fields, both with water (McKenzie, 2001; Moore, 2001b).

Impacts of accident-free truck transportation. The shipping of SNF and HLW through Eureka County by legal-weight truck would create possible impacts on range resources from the release of pollutants in vehicle exhausts, the possible spreading of noxious weeds, and collisions between livestock and trucks or escort vehicles.

Impacts of a transportation accident. An accident involving a shipment of SNF or HLW through Eureka County would create a potential impact on range resources from loss of forage, through wildfire, ground disturbance, contamination, or a combination. The loss of forage could be temporary or, in the case of severe accident, more or less permanent. In a severe accident involving the release of radioactivity, direct mortality or serious injury could occur to livestock in the immediate vicinity.

Scenic resources

Impacts of accident-free rail transportation. To the extent that the proposed action affects existing landscapes that viewers travel through, recreate in, or reside in, there would be an effect on scenic quality. It is likely that the proposed rail line, and the various facilities near Beowawe, would affect views of and views from the Maiden's grave, which is a widely-appreciated viewpoint among persons familiar with the area.

One assessment of visual impacts could be based on the BLM's visual contrast rating system, in which effects on visual resources would be assessed for construction, operation, and closure of the proposed action. Two issues would be addressed: (1) the type and extent of actual physical contrast, and (2) the level of visibility of the facility, activity, or structures. (See USDO, 1999.)

In the BLM's impact rating system, visual effects are evaluated by identifying line-of-sight points of project visibility, as well as key observation points (KOP), from which proposed facilities may be visible from routinely accessible vantage points. The extent of the impacts of the proposed action would depend upon the amount of visual contrast created between the proposed facilities and existing landscape elements (i.e., form, line, color, texture) and features (i.e., land and water surfaces, vegetation, structures). (See USDO, 1999.)

Under the BLM's impact rating system, impacts are significant if visual contrasts resulting from a proposed action affect: (1) the quality of scenic resources, especially those with rare or unique values, or (2) views from, or visual settings of, designated or planned parks; wilderness and natural areas; other visually sensitive land uses; travel routes; recreational, educational, and scientific facilities; use areas and activities; and viewpoints or vistas. (See USDOl, 1999.)

According to the DOE (1999a), the proposed action would not exceed the aesthetic criteria in the BLM's visual resources management guidelines, but more stringent management requirements would be necessary to maintain the existing character of the landscape if the rail line crossed Class II lands. (The Crescent Valley is classified as Class IV.)

Impacts of accident-free truck transportation. If the shipment of SNF and HLW through Eureka County required the construction of maintenance or service facilities, such facilities would have a potential impact on scenic resources, by affecting views and contrast ratings.

Impacts of a transportation accident. An accident involving a shipment of SNF or HLW through Eureka County would have potential scenic impacts associated with the risk of ground disturbance or wildfire. A severe accident involving a major contamination episode could have a profound scenic impact, depending upon its location. If, for example, the accident were adjacent to the Humboldt River, the appearance of the River corridor could suffer long-term degradation during decontamination efforts.

B. The Human Environment

Cultural resources

Impacts on cultural resources, generally. Regardless of the alternative selected, the proposed action would irreversibly alter a historic way of life in the rural West. The oral history project, *Eureka Memories*, listed in the introduction to this report, documents this aspect of cultural resources.

Impacts of accident-free rail transportation. Ground disturbance activities during the construction phase of the proposed rail corridor could crush or disturb archeological sites, or expose or cover sites by creating soil erosion. Indirect impacts may also occur during the construction phase, including disturbance of archeological sites by purposeful or accidental actions of project employees (USDOE, 1999a).

Possible impacts could also occur during both construction and operations to sacred springs and burial sites of the Newe (i.e., Western Shoshone), and to Pleistocene fossils. (See USDOl, 1999.) Other cultural resources that would be potentially impacted are the Maiden's Grave (which is about one mile from the proposed connection to the UPRR tracks near Beowawe), Gravelly Ford, the California trail, the Pony Express Trail, and other historic roads and trails.

Impacts of accident-free truck transportation. If the shipment of SNF and HLW through Eureka County by legal-weight truck required the construction of service or maintenance facilities, the

proposed action would have a potential impact on cultural resources, due to ground disturbance or direct damage to the resources.

Such shipments, whether they occur in Eureka County or elsewhere, could also result in an economic slowdown or fiscal impacts on governmental entities, with resulting indirect impacts on cultural resources (from lack of maintenance and upkeep, for example).

Impacts of a transportation accident. An accident involving a shipment of SNF or HLW through Eureka County would have potential impacts on cultural resources related to damage occurring during emergency response and the risk of wildfire, both of which could cause trampling, crushing, or exposure of cultural items. Such impacts may be greater in the vicinity of the Humboldt River. In the event of a severe accident with a release of radioactivity, access to cultural resources would be potentially lost due to contamination, and the resulting economic slowdown would create indirect impacts on cultural resources.

Population and demographics

Impacts of accident-free rail transportation. The DOE (1999a) says that the Carlin rail line would result in a statewide population increase of 790 persons. It is not known how much population growth, if any, would occur within Eureka County. After the completion of the construction phase, the new operational jobs associated with the rail line would probably result in some employees and their families residing in Eureka County. (However, the Beowawe facilities would also be within driving distance of residential areas in Battle Mountain and Elko County.) Operation of the rail line as a shared facility would also create the potential for new jobs and some new County residents. Any economic downturn would cancel some or all of the gains.

Impacts of accident-free truck transportation. The shipment of SNF and HLW through Eureka County by legal-weight truck would create a possible small increase in employment for service and maintenance personnel or businesses, with a resulting small increase in population. Whether the shipments passed through Eureka County or not, however, economic impacts could cancel some or all of the gains.

Impacts of a transportation accident. In the event of an accident involving a shipment of SNF or HLW through Eureka County, the resulting economic downturn would result in employment and population losses in the County. It is possible that those remaining in the County would be the least mobile or adaptable persons, including the elderly and the poor. In a severe accident involving a release of radioactivity, there would be a risk of direct and indirect mortality to the population.

Land ownership

Impacts of accident-free rail transportation. The construction of the proposed Carlin rail line through Eureka County would convert a large, but presently unknown, amount of private land to public use, by willing-seller transactions, the use of eminent domain, or sale under threat of eminent domain. Note that 60 percent of the assessed private parcels of land in Eureka County

are within 10 miles of the proposed tracks. The conversion of private land to public use would have secondary impacts on economics and property tax revenues, and would conflict with Eureka County's master plan, which encourages the conversion of public land to private ownership. (See Figure 9, map of land ownership as affected by the corridor.)

Impacts of accident-free truck transportation. If facilities are required to support the shipment of SNF and HLW through Eureka County by legal-weight truck, there would be a small potential impact on land ownership, from the conversion of private land to public use, or the conversion of public land to a different public use.

Impacts of a transportation accident. An accident involving a shipment of SNF or HLW through Eureka County would result in County-wide devaluations of private property, especially in the immediate vicinity of the accident, but land ownership would remain the same, at least initially. It is possible that such an accident would force distress sales of private property, to public entities or to other private parties.

Economy

Generally. The presence of any industrial facility or operation in a given area will create direct and indirect economic impacts. Unlike some non-nuclear facilities, however, nuclear facilities involve such issues as fear and perceived risk. In one example, the Clinch River MRS facility, an environmental study group identified potential adverse impacts for business recruitment and expansion, residential recruitment and retention, institutional trust, tourism, aesthetics, and neighbors (DOE, 1999a). Thus, these less tangible types of impacts must be considered, in addition to direct impacts on employment and spending, for example.

Similarly, the State of Nevada has raised concerns regarding negative perceptions of nuclear waste, including possible reductions in short-term visitation, in-migration, and the ability to attract new businesses. Economic impacts could, therefore, include reduced economic activity and the loss of income and jobs as a result of the decline of visitors to the area and the decline of property values along waste transportation routes. Reasons for diminished property values include fear, risk, and stigma for the residential sector. In the commercial and industrial sectors, reasons include worker fear, higher insurance premiums, loss of prestige locations, product tainting, and loss of productivity during accident scenarios. (Massey, pers. comm., 2001)

Impacts of accident-free rail transportation. Development of the Carlin rail line will affect the economy of Eureka County due to construction and annual operation of the line. Two types of economic impact are generally associated with industrial development projects that require large capital outlays. First, the construction phase requires an influx of workers from outside the area, and increases economic activity and the amount of money circulating in the local economy. Materials and services may be purchased locally, for example. Second, the post-construction phase requires a considerably smaller labor force, which can lead to a boom and bust cycle and downsizing costs. During the operations (post-construction) phase, the labor force and population base are more stable, and private sector investment occurs in retail trade and services, based on market conditions (Fletcher, 2001).

Economic sectors that could be affected by construction and operation of the rail line include: mining, government, tourism, recreation, agriculture, and main-street business (Fletcher, 2001).

During the construction phase, Fletcher (2001) assumes that work camps will provide food and lodging, that all available housing will be promptly occupied, that temporary housing may be imported, and that local economic activity will increase from retail purchases of food, beverages, groceries, gasoline, and miscellaneous items. There would be a small stimulus to the local economy while work crews were in the vicinity, but it would be unlikely to create additional investment. (If additional investment is small, the likelihood of an economic bust upon departure of the crews would be minimized.)

The DOE (1999a) says that construction would result in 500 direct-employment construction jobs for three years, and that there would be 47 operations jobs. The DOE also says that the Carlin rail line would result in 1,100 new jobs.

Economically speaking, an important aspect of the proposed action is the construction and operation of rail headquarters facilities near Beowawe, which would have a permanent economic effect (Fletcher, 2001). These facilities would be staffed with permanent employees, likely from outside Eureka County, and create increased demand for housing, schools, and government services. It is likely, also, that the private sector would respond with retail and service establishments, based on supply and demand projections.

There are a number of uncertainties regarding the economic impacts of these facilities near Beowawe, including: (1) the exact location of the operations headquarters and maintenance facilities, (2) their size and staffing requirements, (3) their timing, (4) their effect on visitation, and (5) whether the rail line would be a single-use or shared-use line. The facilities could become the nucleus of expanded economic development, planned or unplanned, along the I-80 corridor, including industrial enterprises, housing, and utilities (Fletcher, 2001).

One economic effect related to development of the Carlin rail line is the loss of livestock production, measured in AUM, as discussed earlier in this part. These economic effects are a function of the total AUM available, livestock access to forage, the number and location of livestock underpasses, and the availability of stock water. Based on a University of Nevada Cooperative Extension fact sheet, the average value of an AUM is \$28.16 (Fletcher, 2001). Thus, the loss of 100 AUM (e.g., 20 cows for 5 months) would have a value of \$2,816. Every loss of 100 AUM would translate into a decrease of \$5,365 in total annual economic activity in Eureka County, including \$1,218 in annual personal income, and the loss of 0.07 jobs. (See Fletcher, 2001.)

Fletcher (pers. comm., 2001) advises against converting these static estimates of economic impact into long-term estimates, given the many unknowns that affect long-range forecasts. Nevertheless, the present value of the economic activity associated with a decrease of 100 AUM, each year for 100 years, with an interest rate of 4 percent, is about \$131,500 (calculation by the editor).

Another economic impact of development of the Carlin rail line would be impacts on tourism and visitation. Fletcher (2001) estimates that Eureka County receives about 20,758 overnight visitors per year. Each visitor-night contributes \$89.93 in total economic activity, including \$23.37 in personal income, to the local economy, and supports 0.0018 jobs in Eureka County.

Although the effect of the presence of the rail line on visitation is unknown, it is unlikely to increase visitation, given the issues of fear and perceived risk. If annual visitation decreased by 10 percent (i.e., by 2,076 visitor-nights per year), Eureka County's economy would suffer a loss of \$186,695 in total economic activity, including \$48,516 in personal income, and four jobs. (The present value of the economic activity associated with a 10 percent decrease in visitor-nights, each year for 38 years of a shipping campaign, with an interest rate of 4 percent, is about \$3.62 million (calculation by the editor).)

One particular category of visitation to Eureka County is hunting and fishing. If development of the rail line decreases visitation and expenditure associated with hunting and fishing, economic impacts will be created (Fletcher, 2001). In Nevada, the average angler spends nine days per year fishing, spending \$37 per day. The average hunter spends 13 days per year hunting, spending \$32 per day. Wildlife viewing is another popular activity; the average participant spends \$585 per year on this activity. (USDOI & USDOC, 1998).

In addition, economic impacts on private property owners with improvements in close proximity to the rail line can be expected. Some property owners may be adversely affected, depending on their ingress and egress and the number and location of accessible crossings (Fletcher, 2001). Based on a review of a separate analysis prepared for the State of Nevada regarding Clark County (UER, 2000), Eureka County's assessor estimates that property values within three miles of the rail corridor and the UPRR tracks would be adversely affected by three percent (Fletcher, 2001). Thus, the net value of property in Eureka County within three miles of the UPRR tracks and the proposed spur would decrease from \$8,893,521 to \$8,626,715 (Mears, pers. comm., 2001). In the absence of an accident, the diminution of property values would occur with the commencement of shipping of SNF and HLW, and continue throughout the shipping period.

If shared use of the rail line were to occur, the affected area would experience increased economic productivity from increased transportation opportunities, lower transportation costs, reduced accidents, and lower air pollution emissions than comparable shipment by truck, according to the DOE (1999a). Rail transportation may be a cost-effective option for such activities as exporting containerized alfalfa hay, importing feed grains and other concentrates for use in dairy production, and other possible uses (Fletcher, 2001).

Impacts of accident-free truck transportation. The shipment of SNF and HLW through Eureka County by legal-weight truck would involve little or no construction, and a smaller operations effort than rail transportation. Nevertheless, economic impacts would result from fear and perceived risk issues, including property devaluation, loss of tourism and visitation, and loss of retail business. There would be a potential small economic impact from retail sales to truck crews and escorts.

Impacts of a transportation accident. A severe accident involving the release of radioactivity in Eureka County would have a large impact on the County's economy (Fletcher, 2001). The extent of the impact would be a function of prevailing winds and the perception of potential harm. The extent of the impact would not be a direct function of the length of the rail right-of-way in Eureka County or the severity of the accident. The impact on property values would be large, depending on their proximity to the accident. There would be adverse impacts on property sales, investment, lending, and financing (Fletcher, 2001).

Extrapolating from the study of Clark County (UER, 2000), an accident without the release of radioactivity would significantly decrease property values (in the range of one to eight percent, depending on the use of the property and its proximity to the accident), and an accident with the release of radioactivity would result in a much larger loss of property value (from ten to 34 percent, again depending on use and proximity). Eureka County estimates that the net value of private property within three miles of the existing UPRR tracks and the proposed Carlin spur would decrease, in the event of an accident with a release of radioactivity, from \$8,893,521 to \$6,047,594 (32 percent) (Mears, pers. comm., 2001).

Also, to the extent an accident causes a reduction in available AUMs, or a decrease in visitation to the County, the same types of economic effects described earlier (for accident-free rail transportation) would also occur.

Housing

Impacts of accident-free rail transportation. During construction of the proposed Carlin rail line, all available housing units in Eureka County (or at least the northern portion) would be immediately occupied, and additional housing would likely be provided in response to housing demand, either temporarily or permanently, in addition to the housing provided at work camps.

During the operations phase of the proposed rail line, housing impacts would depend on the number of jobs created and the percentage of those employees choosing to live in Eureka County. Shared use of the rail line would likely result in more new jobs and a higher demand for housing. However, any economic slowdown resulting from loss of visitation, loss of livestock production, or other factors would offset some or all of the increased housing demand.

Impacts of accident-free truck transportation. The shipment of SNF and HLW through Eureka County by legal-weight truck would create a slight additional demand for housing for service and maintenance employees. Again, however, any economic slowdown would offset some or all of the increased demand.

Impacts of a transportation accident. An accident involving a shipment of SNF or HLW through Eureka County would result in a potential increase in housing vacancy rates from the associated economic downturn. A potential deterioration of housing stock would also occur, from lack of maintenance and investment. The extent of these impacts would be proportional to the perceived seriousness of the accident. A severe accident, or a fire resulting from an accident, could also cause the actual physical loss of housing stock, temporarily or permanently.

Mining and minerals

Impacts of accident-free rail transportation. If shared use of the proposed rail line were to occur, mine owners and operators would potentially benefit from lower transportation costs for supplies and their production. On the other hand, construction of the rail line would potentially result in the withdrawal of mineral lands or outright taking or purchase of mining claims or patents near or adjacent to the right of way. (See Figure 10, map of patented mining claims.)

The rail line and its effects on local roads would also cause possible access issues for mines and miners. According to testimony before the DOE at the Crescent Valley public hearing on December 9, 1999, the proposed rail line would divide the existing Cortez mine (in Lander County) and cross a haul road that is in regular use.

Impacts of accident-free truck transportation. Regular or irregular shipments of SNF and HLW through Eureka County by legal-weight truck would create potential operational conflicts for mining, resulting from shared use of highways by trucks carrying hazardous mining materials (e.g., explosives) and trucks carrying SNF and HLW shipments.

Impacts of a transportation accident. An accident involving a shipment of SNF or HLW through Eureka County would create potential access problems for mines and miners, if access points had to be closed off as a result of contamination, temporarily or permanently. An accident may also diminish the supply of available laborers for the mines, due to worker fear or perceived risk of radiation.

Infrastructure and public facilities

Impacts of accident-free rail transportation. The construction phase of the proposed rail line would generate a significant volume of liquid and solid wastes, including waste lubricants, solvents, paint, other hazardous materials, sanitary wastes, industrial wastes, and scrap rails, ties, bridge timbers, and track fastenings (USDOE, 1999a; Moore, 2001b). Also, construction of proposed support facilities, such as those proposed at Beowawe, would generate waste concrete, lumber, packaging, and other wastes. To the extent that these wastes are not salvaged and must be disposed of within Eureka County, they would constitute an additional burden on the County. Construction wastes may not be compatible with waste handling facilities at existing sites, and the volume of waste may consume all available capacity in the Eureka landfill, to which northern Eureka County exports its solid waste (Moore, 2001b; A. Johnson, pers. comm, 2001.).

Regarding aviation, the proposed rail line would be located about 700 yards east of the Town of Crescent Valley's airport. Based on the slope of the ground to the east, regulations of the Federal Aviation Administration for this class of airport require that potential obstructions (such as the rail line) be at least 500 feet from the end of the runway. Construction of the rail line as proposed would, therefore, prevent any future lengthening of the affected runway or any change in the level of service it provides (Moore, 2001b).

Also, the proposed rail line would bisect several local roads in Eureka County. (See Figure 11 for a map of affected roads.) A person's ability to cross the rail line would greatly influence the

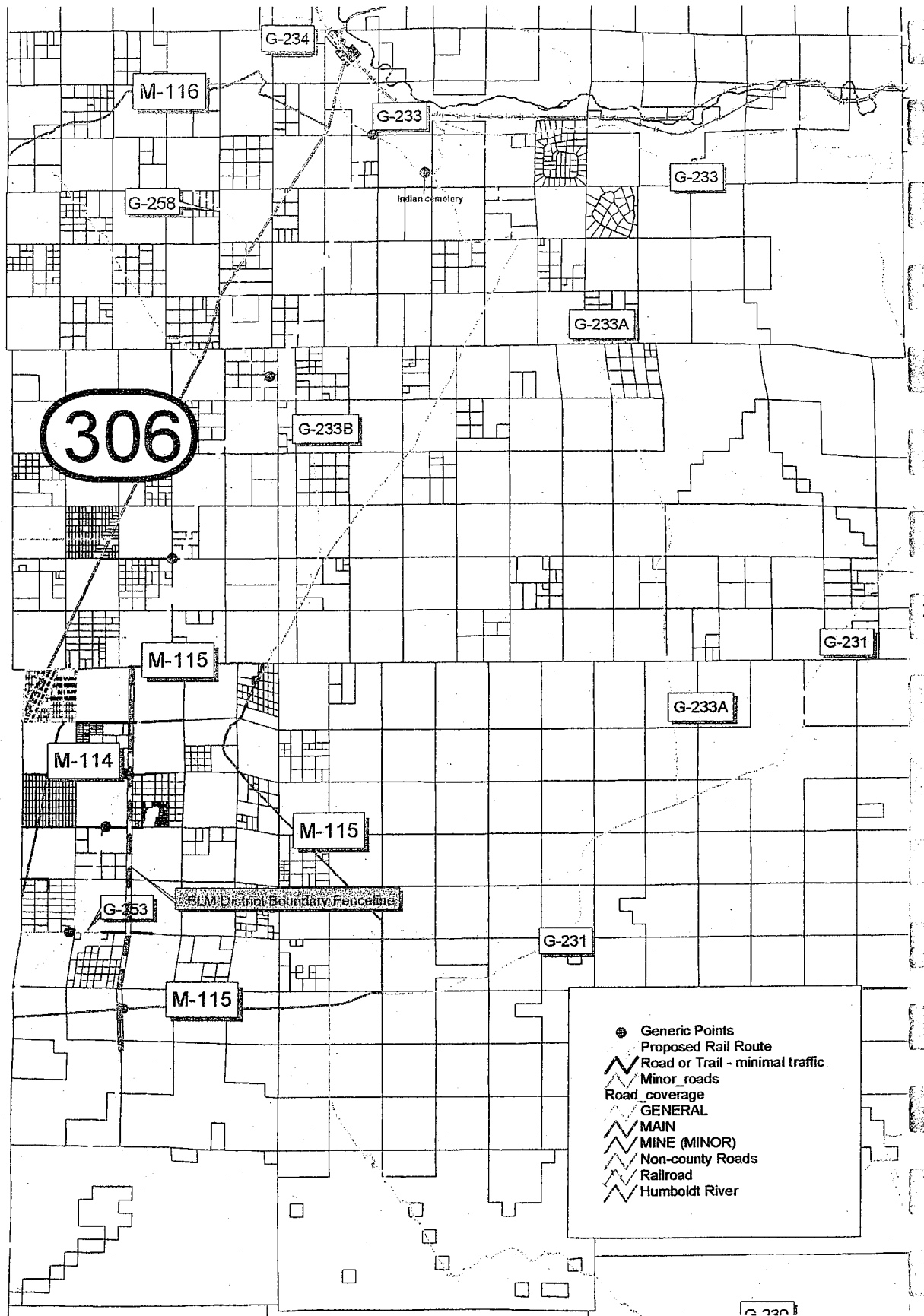


FIGURE 11

degree of the impact on that person. As described earlier in this report, the DOE plans one grade-separated road crossing in Eureka County, for the intersection of the proposed rail line with the Dean/Dann/Spa Road, County Road M-115. The DOE also plans one signaled at-grade crossing at an unspecified location. The remaining crossings would be unsignaled, at grade. Given the lack of topographic relief, the use of underpasses would be very limited (Moore, 2001b).

The proposed action would cause significant delays at at-grade crossings of the Beowawe-Rose Ranch Road (County Road G-233) near Beowawe. Delays at this location would occur because of its close proximity to the connection with the existing UPRR tracks and the interchange with mainline trains. The impacts would be greater if the DOE selects the general freight option, since rail cars carrying SNF and HLW would have to be switched out of freight trains and stored at a siding for delivery to the proposed geologic repository via the Carlin spur. With dedicated trains, delays would be shorter (Moore, 2001b).

Delays at the at-grade crossing of County Road G-233 would degrade emergency services provided by the Beowawe Volunteer Fire Department. When the crossing is blocked, response calls to the east of Beowawe on G-233 would be delayed. Responding units would either have to wait for the tracks to clear or travel north on I-80 and south on County Roads G-236 and G-238 to respond (Moore, 2001b). Although G-233 is lightly traveled at the present time, development in the vicinity of Beowawe and the Humboldt River corridor could increase traffic volumes.

County Road G-233B, Cold Springs Point Road, would also be affected by construction and operation of the proposed rail line where the two intersect.

Current school bus routes would not be affected by the proposed rail line. (One current route generally follows Nevada 306, connecting the Town of Crescent Valley with Beowawe and Battle Mountain. Another route connects the Crescent Valley, Pine Valley, and Carlin. It starts east of the proposed rail line at the Hay Ranch and proceeds northeast to Pine Valley and Carlin.) However, although current school bus routes would not cross the proposed rail line, some school children might need to cross the tracks to meet the school bus. Further, a rail line dividing the Crescent Valley would limit the school district's future flexibility regarding changes in enrollment areas for elementary school students (Moore, 2001b and pers. comm., 2001).

Impacts of accident-free truck transportation. Shipping SNF and HLW through Eureka County by legal-weight truck would contribute to wear and tear on the State highway system and increase the need for highway maintenance. Such shipping would also utilize some portion of the existing highway capacity, which is, in general, constrained by the factors such as those noted by Halstead (2001), including sharp curves, steep grades, passes affected by weather, two-lane configuration, lack of guard rails, and others. To the extent that shipments by truck share the highways with school buses, the shipping campaign would cause potential conflicts with parents, teachers, and school officials.

Impacts of a transportation accident. An accident involving a shipment of SNF or HLW through Eureka County would have large potential impacts on infrastructure and public facilities. There would be a risk of damage to or contamination of roads, highways, schools, public buildings,

equipment (especially fire-fighting and emergency response equipment), the Crescent Valley water system, and the Crescent Valley airport. Such damage or contamination could result from a non-radioactive spill, a release of radioactivity, a fire, emergency response activities, or a combination. An accident with a release of radioactivity would possibly create quantities of contaminated solid and liquid wastes, which would require appropriate disposal.

Public finance

Impacts of accident-free rail transportation. Construction and operation of the Carlin rail line would expose local governments in Eureka County to potential fiscal impacts, due to the need to increase government services (Fletcher, 2001) and other factors. Categories of fiscal impacts include: (1) costs incurred for emergency management and response capabilities, (2) general government and administrative costs, other than emergency management and response, (3) losses in State services due to reallocation of resources at the State level, (4) losses in visitor-related tax revenues, and (5) losses in property tax revenues. It is important to note that the Eureka County School District, the Town of Eureka, the Town of Crescent Valley, and any special districts would experience fiscal impacts, in addition to Eureka County itself.

In the post-construction phase, local governments in Eureka County will have better information and a more stable tax base, and would be able to make necessary public services available. Nevertheless, there would be a need to maintain equity between established residents and new residents. It might be appropriate to consider the imposition of impact fees, by ordinance, to support capital costs of schools, utilities, streets, and parks (Fletcher, 2001).

Whether a transportation accident involving SNF and HLW occurs, Eureka County would establish a regional emergency response strike force and training program, staffed by professional (not volunteer) personnel. A spreadsheet model developed for this impact assessment report (Johnson and Massey, 2001) includes costs over 40 years for personnel, communications equipment, other equipment, and training. The total of all expenditures would be \$4.37 million, with a present value of \$754,000 (assuming a 5 percent interest rate), to be borne by the project proponents.

Regarding taxes and fees collected at the State and county levels (described earlier under the Affected Environment), the proposed action would result in a statewide economic downturn, according to the Clark County study. Therefore, the proposed action would result in lower than normal revenues to Eureka County's local governments. The downturn would affect Eureka County regardless of what transportation alternative the DOE selects. If the Carlin rail alternative were selected, impacts on Eureka County would be magnified. Revenues would be diminished from *all* sources of public revenue listed in the description of the affected environment, earlier in this report.

Impacts of accident-free truck transportation. The impacts on public finances from shipping SNF and HLW through Eureka County by truck would be similar to the impacts from shipping by rail. There would also be additional impacts on public finance related to wear and tear on roads and highways and the possible need to expand highway capacity.

Impacts of a transportation accident. The impacts on public finances from an accident involving a shipment of SNF and HLW through Eureka County would be similar to the impacts of the accident-free scenarios, but larger in magnitude. The cost burden on the County would potentially be far greater than the County's ability to pay, and the revenue losses could be severe. It is not known whether the County would have any exposure to liability from the short-term or long-term consequences of an accident. In any event, the County would have legal expenses resulting from any accident of this nature.

Outdoor recreation

Impacts of accident-free rail transportation. During both the construction and operations phases of the proposed rail line, the proposed action could limit public access to recreation areas currently in use by the public (USDOE, 1999a). Alternatively, roads constructed as a part of the proposed action could provide motorized access to allow hunters and other persons to reach new areas (McKenzie, pers. comm., 2001).

If, as discussed earlier, operation of the proposed action causes a decrease in visitation to Eureka County, recreation sites would be adversely affected to the extent they are fee-supported, or receive revenue based on visitor counts.

Impacts of accident-free truck transportation. The shipment of SNF and HLW through Eureka County by legal-weight truck would create a potential for impacts on outdoor recreation caused by the introduction of pollutants, the spread of noxious weeds, and effects on wildlife (especially big game). Any economic slowdown associated with such shipments, whether or not they travel through Eureka County, would also affect the supply and maintenance of developed recreation facilities.

Impacts of a transportation accident. A transportation accident involving a shipment of SNF or HLW through Eureka County would create access limitations, either temporary or permanent, for nearby outdoor recreation areas.

Public health and safety

Generally. The health and safety of various groups of individuals would be affected by their proximity to the transportation routes. Such groups include: (1) members of the public along the route, (2) members of the public sharing the route, (3) members of the public during stops, (4) transportation and security workers, and (5) construction workers. Some health and safety issues are related to radiation, while others are not. A medical clinic serves the Town of Crescent Valley and the surrounding region; there are no medical facilities in Beowawe.

In incident-free transportation, the shipping casks for SNF and HLW would still emit radiation. The amount of radiation a person would absorb depends on their distance from a cask. The DOE (1999a) estimates that radiation doses at a distance of 2 meters from the sides of the vehicles would be over half the regulatory limit. A person would absorb 10 millirem/hour at 2 meters from the side of the vehicle, and 0.2 millirem/hour at a distance of 30 meters.

The DOE (1999a) has produced a very confusing array of tables of anticipated health impacts on workers and the public. The following paragraphs attempt to summarize the most salient points.

Impacts of accident-free rail transportation. Exposure to radiation, in the absence of an accident, would cause 0.26 to 0.33 latent cancer fatalities (LCF) in transportation workers, and 0.31 to 0.36 LCF among the public, in the DOE's mostly-rail scenario over a 38-year shipping campaign, statewide. Other industrial accidents from the operation of the proposed Carlin rail line would result in 210 recordable accidents and illnesses to workers, 120 lost workday cases, 0.4 worker fatalities from operations, and 1.1 traffic fatalities during commuting.

A specific class of rail transportation workers, inspectors, would absorb more radiation than other workers. The DOE (1999a) says inspectors in the mostly-rail scenario would have a six percent greater likelihood of a fatal cancer than the average person (based on a 24-year shipping campaign). If administrative controls similar to those at other DOE facilities were put in place to limit the exposure of workers, including inspectors, individual doses would be limited to 2 rem per year (USDOE 1999a).

If rail cars transporting SNF or HLW were delivered to Beowawe by general freight, public health would be affected by the parking of rail cars at Beowawe while trains bound for Yucca Mountain were made up. Halstead (pers. comm., 2001) has estimated the radiation doses from a shipping cask on a rail car parked at a siding. He assumes that 521 loaded rail casks would pass through Beowawe each year for 38 years under the mostly-rail scenario. A person located 20 meters (about 60 feet) from the side of a cask for a 48-hour period would absorb a radiation dose of 12 millirem. If a rail cask were parked at Beowawe 50 percent of the time, a person located 20 meters away would absorb an annual dose of 1,090 millirem, and a person located 100 meters (about 300 feet) away would absorb about 33 millirem. These levels of exposure would represent a significant increase above background radiation doses. Imus (1995) says that the background dose from cosmic and terrestrial sources is about 100 millirem per year. Other estimates of background radiation absorbed annually by individuals are in the 350 to 400 millirem range.

Regarding construction workers, the DOE (1999a) estimates there will be 100 construction worker injuries and illnesses on the Carlin rail line.

Impacts of accident-free truck transportation. The DOE (1999a) estimates that accident-free transportation of SNF and HLW through Nevada in the mostly legal-weight truck scenario would result in 1.2 latent cancer fatalities among workers, and 2.6 LCF among the public, over a 38-year shipping campaign, statewide.

According to Halstead (2001), in towns in Nevada where buildings are located within 10 meters of shipment routes, some individuals could absorb annual doses of radiation equivalent to 40 to 60 percent of the average annual background radiation dose. The impacts of such doses are not exactly understood, Halstead says, but would impose significant socioeconomic impacts on individuals and communities.

A specific class of truck transportation workers, inspectors, would absorb more radiation than other workers. The DOE (1999a) says that inspectors in the mostly-legal weight truck scenario would have a eight percent greater likelihood of a fatal cancer than the average person (based on a 24-year shipping campaign).

Impacts of a transportation accident. A severe transportation accident would involve a release of radioactive material, as described earlier in this document in the description of the proposed action. The DOE (1999a) says that an individual absorbing the maximum amount of radiation from a severe accident on the Carlin rail line would absorb a dose of 26 rem. This is far higher than the maximum recommended dose for a person who works near radiation sources, and could produce very serious effects (Harvey, 1969).

The DOE says that the maximum foreseeable accident scenario on the Carlin rail line would result in 31 latent cancer fatalities among the population, and that the maximally-exposed individual would have a probability of 13 thousandths of becoming a latent cancer fatality.

Rural highway routes in Nevada are disadvantageous, from a safety standpoint, due to their two-lane configurations, sharp curves, steep grades, narrow shoulders, absence of guardrails, mountain passes affected by weather, and tactical concerns related to sabotage and terrorism (Halstead, 2001). The DOE (1999a) says the impacts from an act of sabotage against a legal-weight truck would be greater than the impacts from sabotage against a rail car. Although the rail car would carry six times more spent fuel, an accident involving a truck would release more radioactivity.

Wind speed and direction are key variables in estimating the severity of an accident with a release of radioactivity. More information is needed on wind speed and direction in Eureka County.

Noise, land use, and the quality of life

Impacts of accident-free rail transportation. During the construction phase of the proposed rail line, estimated noise levels are 62 to 74 dBA within 150 meters of construction noise sources, and 54 to 67 dBA at a distance of 600 meters. Noise sources will exist both in the proposed corridor and on connecting roads to borrow and spoil areas (USDOE, 1999a). The DOE does not say whether these are cumulative or single-event noise levels.

During the operations phase of the proposed rail line, assuming train speeds do not exceed 80 km/hr (about 47 mph), the estimated volume of noise from a train consisting of two locomotives and ten cars is 51 dBA at 2000 meters and 62 dBA at 200 meters, expressed as an equivalent continuous (average) sound level.

The proposed rail line would be located farther from Beowawe than the existing UPRR tracks, and would carry less train traffic. Therefore, although the proposed action will increase noise levels, the increase will not be as large as the existing noise levels (Moore, 2001b).

The Town of Crescent Valley is located about 18 miles from the existing UPRR tracks, while the proposed rail line would pass about one mile east of the town. This change will generally affect the nature of this rural community, and will expose the community to a noticeable increase in ambient noise levels (Moore, 2001b).

Assuming a 2.5-year construction phase, construction delivery vehicles will travel 19 million miles, resulting in 0.3 traffic fatalities and 0.0014 fatalities due to vehicle emissions. Vehicles of commuting workers will travel 76 million miles, resulting in 0.8 traffic fatalities and 0.0055 fatalities due to vehicle emissions (USDOE, 1999a). During the operations phase, vehicles of commuting workers will travel 68 million miles (over 24 years), resulting in 0.7 traffic fatalities and 0.005 fatalities due to vehicle emissions (USDOE, 1999a). Note that these estimates also cover Lincoln County and Nye County.

After construction of the rail line and associated structures is complete, their presence may influence future development, land use, and zoning adjacent to the rail line in the Crescent Valley or near Beowawe (USDOE, 1999a). Depressed property values (discussed earlier in this document) and uncertain economic conditions complicate predictions of the nature of such effects.

It should be noted that the proposed rail line would cross areas of potential future community growth. The rail line and interchange facilities would prevent any future growth of Beowawe to the east, and the rail line would prevent any growth of the Town of Crescent Valley to the east (Moore, 2001b).

Any evaluation of land use impacts should also consider the effect of dividing the Crescent Valley itself and current and future land uses with a rail line for the transport of SNF and HLW. The movement of vehicles, equipment, and livestock would be complicated by the need to cross the rail line. Splitting a ranching operation would have impacts on the entire operation, not just the area within the right of way. Similar impacts would be felt by other types of businesses, and also by governmental entities (Moore, 2001b).

Impacts of accident-free truck transportation. The shipment of SNF and HLW through Eureka County by legal-weight truck would affect the quality of life for residents of and visitors to the County by introducing additional noise and traffic. There would also be possible land use effects related to an increased number of service business and facilities, as well as a potential economic slowdown related to fear and perceived risk. Overall, the quality of life would be adversely affected by the combined, mostly minor, impacts on the economy, recreation, public finance, and natural resources.

Impacts of a transportation accident. The impacts upon the quality of life of an accident involving a shipment of SNF or HLW through Eureka County would be extensive, and would result from such combined factors as: diminished public health, increased health care and medical costs, an economic slowdown, image problems, demands on public finances, natural resource damage, litigation, damage to infrastructure (including water systems), contamination, loss of trained labor force, housing deterioration and lack of maintenance, declining property values, fear and perceived risk, and loss of peace and quiet and the small town way of life.

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Part 5:

MITIGATION OF ANTICIPATED IMPACTS IN EUREKA COUNTY

Mitigation, generally

Environmental disclosures produced to date by the Department of Energy (DOE) regarding the proposed geologic repository and its transportation components are vague, incomplete, and inadequate. Until the DOE has adequately described the proposed action, the affected environment, and the anticipated environmental impacts (both specific and cumulative), with full public participation, any description of mitigation is tentative and preliminary.

Also, it would not be possible to completely mitigate certain impacts analyzed in this report, such as the impacts from a severe transportation accident with a release of radioactivity on natural resources, the County's economy, and a way of life. The reader should consider the information in the following paragraphs in this light.

Eureka County has previously discussed, in its written comments on the DEIS (Eureka County, 2000) and earlier in this report, the need for the proposed action to obtain various state and federal permits. These permits should include stringent financial security and bonding requirements, in accordance with the rules and regulations of the permitting authorities.

Finally, all mitigation measures described here must incorporate rigorous monitoring and follow-up, during both construction and operations. Monitoring and follow-up must be conducted to make sure that the DOE and its contractors comply with all conditions of project approval, that mitigation measures are effective, and that mitigation is provided for all anticipated and unanticipated impacts. When the DOE prepares and circulates the required environmental disclosure documents, they must describe all types of monitoring in detail, and identify the entities responsible for conducting and paying for all activities. State and local authorities must oversee all monitoring efforts, but the DOE must either pay all monitoring costs or make sure they are paid by others.

Examples of the types of activities that require monitoring include: conduct of the proposed shipping campaign during floods and other natural disasters; compliance with regulatory limits on the amount of time a rail car loaded with spent nuclear fuel or high-level radioactive waste may be parked in one location; and damage to and repair of fences.

Mitigation of impacts on the natural environment

Hydrology and water resources. Mitigation must be provided for direct and indirect impacts from flood damage to the proposed rail line. The mitigation must include measures to mitigate

operational disruptions to SNF and HLW shipments caused by flooding, so that the residents of Eureka County are not exposed to additional health and safety risks. Contingency plans for reconstruction of flood-damaged infrastructure must also be included.

The DOE must also completely mitigate the release of surface and groundwater contaminants, from both construction and operations, as well as the construction- and operations-related impacts of water wells installed for the construction phase. If the construction of the proposed rail line results in waste rock piles, they must be evaluated for acid rock drainage potential, and any corresponding impacts must also be mitigated. Water resource impacts from all surface disturbance, cuts, fills, pits, and roads, temporary and permanent, must be completely mitigated with best management practices and a stormwater pollution prevention plan approved by Nevada's Division of Environmental Protection. Waste rock dumps must be engineered and constructed to mitigate acid rock drainage, ensure long-term stability, provide for concurrent and final reclamation, and reduce overall visual impacts.

The DOE must describe the potential water resource impacts of a severe accident involving the release of radioactivity, including impacts that would be created during and by the response, and prepare a complete mitigation program for those impacts. That program should include plans to compensate the owners of any water rights rendered useless by an accident.

Air resources. The DOE must identify impacts on sensitive receptors and provide mitigation for all air pollution that would be created during the construction and operations phases of the proposed action. Covered sources must include, at a minimum, haul trucks, other mobile construction equipment, workers' vehicles, service vehicles, train locomotives, boilers, burners, legal-weight trucks carrying SNF or HLW to the proposed repository, escorts, disturbed land, borrow pits, landfills, roads, lay-down areas, and the railroad right-of-way itself. The mitigation program must include all necessary dust suppressants during the construction and operations phases.

If the proposed action is affected by the prevention of significant deterioration (PSD) requirements of the federal Clean Air Act, the DOE must provide mitigation for any adverse financial and economic impacts the proposed action has on existing industries and Eureka County, including impacts on future economic development opportunities.

The DOE must describe the potential air resource impacts and resultant health effects of a severe accident involving the release of radioactivity, including impacts that would be created during and by the response, and prepare a complete mitigation program for those impacts.

Vegetation and soils. Implementation of the proposed action must include mitigation of all impacts on soils and vegetation in Eureka County. At a minimum, the mitigation program must address: the reclamation of all disturbed land, including land fills and borrow pits; identification and protection of all sensitive plant species; control and eradication of noxious weeds; wind and water erosion; soil compaction; wildfire; removal of contaminated soil following a transportation accident; and soil disturbance during emergency response activities.

A reclamation plan must be prepared, with the objectives of minimizing public safety hazards, stabilizing disturbed areas, and providing a post-project surface condition consistent with the anticipated long-term land use (e.g., wildlife habitat, grazing). The DOE must post a bond with the State of Nevada or Eureka County to ensure that reclamation work will be done, and create a long-term contingency fund for long-term monitoring and corrective actions that may be required. The bond should cover not only contractor costs but also supervisory and administrative costs of affected public agencies.

Regarding noxious weeds, the mitigation program must include a weed coordinator during the construction phase. The coordinator would work for and report to Eureka County (at the DOE's expense), and would be responsible for mapping, construction scheduling, and weed spraying, in coordination with the BLM, County road crews, and DOE contractors.

Wildlife and fish. The DOE must evaluate and mitigate all impacts on wildlife and fish, including, at a minimum: the loss of wildlife habitat and forage; degradation of habitat by nearby human activity; obstructions to wildlife movement; entrapment; impacts upon sage grouse strutting grounds; impacts on other sensitive wildlife species; impacts on brook trout, brown trout, and other fish; habitat damage created by invasions of noxious weeds; wildlife mortality in collisions with vehicles; and the risk of wildfire, habitat disturbance, contamination, or a combination as a result of a severe transportation accident. The DOE should place special emphasis on protection of resources in the Humboldt River and its immediate vicinity.

Range resources. Before the proposed action is implemented, the DOE must identify and mitigate all impacts related to range resources and agriculture. Mitigation must address: loss of forage from construction; lack of success in range reclamation; noxious weed invasions; range and grazing management complications; loss of access to water sources; division of grazing allotments; road closures; damage to existing fences; maintenance of fences; barriers to livestock movement; collisions between livestock and vehicles; and loss of forage, wildfire, ground disturbance, and livestock injury and mortality as a result of a severe transportation accident and the response to that accident.

Scenic resources. The DOE must evaluate and mitigate all impacts to scenic resources created by increased physical contrast, visible facilities, and the consequences of a severe transportation accident and the response to that accident. The mitigation measures must specifically address impacts upon views of, and views from, the Maiden's Grave.

Mitigation of impacts on the human environment

Cultural resources. Impacts on cultural resources must be thoroughly evaluated and disclosed, and mitigation must be provided. Mitigation must address, at a minimum: ground disturbance and soil erosion during construction, and related trampling, crushing, exposing, and covering of cultural resources; disturbance of archeological sites or fossils by purposeful or accidental actions of project employees; damage to or degradation of sacred Newe (i.e., Western Shoshone) sites; damage to or degradation of the historic Maiden's Grave, Gravelly Ford, California Trail, Pony Express Trail, and other roads and trails; indirect effects on cultural resources of an

economic downturn or fiscal impacts on local governments; damage to resources during emergency response; and damage to resources during a project-related wildfire.

Land ownership. The mitigation program for the proposed action must include just compensation for all private property and property rights taken by the DOE or anyone else associated with the action. The mitigation program must also address the secondary effects of such takings on the County's economy, property tax revenues, and other tax revenues.

The DOE must consider and address the consistency of the proposed action with Eureka County's master plan, which discourages conversions of private land to public ownership. Specifically, the mitigation program must incorporate transfers of federal lands to Eureka County, the Eureka County School District, and private property owners to offset the loss of property tax base from right-of-way acquisition, and to preserve ranching operations that would be divided or reduced in size by construction of the proposed rail line.

Regarding the potential for a serious transportation accident involving a SNF or HLW shipment, the DOE must evaluate, disclose, and mitigate any and all anticipated impacts on private property values, and provide just compensation for all affected property owners. Such a mitigation program must not depend on Congressional appropriations made after the accident, but must be fully funded up front.

Economy. The DOE must evaluate, disclose, and mitigate all anticipated economic impacts on Eureka County, including, at a minimum, impacts on: business recruitment and expansion; residential recruitment and retention; tourism and visitation; hunting and fishing; diminished real property values; loss of industrial productivity; loss of retail sales; and loss of livestock production.

The DOE must also address the economic impacts of a serious transportation accident, which would be similar to the economic impacts of an accident-free project, but far greater in magnitude. Again, the DOE must specifically address just compensation for devalued real property, fully funded up front.

Housing. The mitigation program must address the provision of adequate housing for all persons associated with the construction phase of the proposed action, as well as any secondary impacts on local residents due to a temporary housing shortage. Also, the DOE must pay the relocation expenses of temporarily and permanently displaced residents.

Mining and minerals. The DOE must evaluate, disclose, and mitigate all impacts on mining and minerals, especially including any withdrawal of mineral lands and purchases of mines or mineral claims in or adjacent to the proposed rail line right-of-way. The DOE must also address anticipated restrictions on mining access, temporary or permanent; operational complications related to conflicts between shipments of SNF and HLW and hazardous mining cargo; and potential labor supply problems that could result from an economic downturn or a transportation accident.

Infrastructure and public facilities. The proposed action must include complete mitigation for impacts on infrastructure and public facilities, including: impacts related to the disposal of solid and liquid wastes; impacts upon the Crescent Valley airport; road closures or divisions; traffic delays (including emergency response delays); impacts on schools and school bus routes; increased wear of State and County highways; and diminished levels of service on roads and highways. Regarding the risk of a severe transportation accident, the mitigation program must address potential damage to or contamination of roads, highways, schools, public buildings, equipment, the Crescent Valley water system, and the Crescent Valley airport.

Regarding proposed railroad terminal facilities near Beowawe, the DOE must consider, during its planning efforts, the potential demand for additional housing, utilities, and infrastructure; preferred locations of industrial enterprises; anticipated impacts on school enrollment and county services; the need for capital expenditures for water supply and wastewater treatment; and required revenues to pay for all additional costs when the rail line becomes operational. (Fletcher, 2001)

Given the lack of a landfill in northern Eureka County to accept solid waste from the construction phase of the proposed action, the DOE must obtain necessary permits and construct an appropriate facility. The facility would become County property upon completion of the construction phase, free from all liability, and with remaining capacity.

Public finance. The DOE must evaluate, disclose, and mitigate all anticipated impacts on the finances of Eureka County, the Eureka County School District, the towns of Eureka and Crescent Valley, and any special districts. The DOE must also determine who would be liable for a transportation accident--the DOE, a government contractor, electric utilities, or others.

Mitigation measures must address the County's costs of emergency response and preparedness; the loss of taxes collected by the State of Nevada and distributed to the County; the loss of taxes and fees collected directly by the County; increased public facility maintenance costs; the costs of needed increases in public facility capacity; and the possibility of up-front payments of all project-related costs. Further, the mitigation program must address both accident-free and severe-accident scenarios.

Outdoor recreation. The mitigation program must also address anticipated impacts on outdoor recreation from access restrictions; diminished recreation revenues; the spread of noxious weeds; the introduction of pollutants and contaminants; and the loss of wildlife and hunting opportunities.

Public health and safety. In accordance with Eureka County's previous comments (Eureka County, 2000) on the DEIS prepared for the proposed action, the mitigation program must include a special escrow fund for prompt and complete compensation of persons affected by routine shipments of SNF and HLW and by transportation accidents. Eureka County's primary responsibility in relation to the proposed repository is to protect the health and safety of the residents of the County. The experience of County residents who were downwind of nuclear weapons tests in the 1950s and 1960s is directly applicable to the proposed action as well.

Upon initiation of the proposed action, the DOE must pay for a baseline health assessment by the affected local governments of all persons within the influence of the Carlin rail corridor, and all other corridors or routes that would be used. When a transportation accident and release of radioactivity occurs, residents must not be subjected to political, administrative, or budgetary delays in the evaluation and payment of claims. All claims must be evaluated against the baseline assessment and paid promptly from an escrow fund set up in advance, and fully funded from the start. This method must ensure that citizens exposed to radioactivity from transportation of SNF and HLW, or from an accident, will be compensated. An independent third party should administer the fund, with an initial endowment of \$1 billion.

Further, the mitigation program must include compliance by the DOE and all contractors with community-right-to-know laws (e.g., SARA Title III) and related laws and regulations regarding the use, storage, and transportation of hazardous materials. Affected communities must have the authority and resources necessary to conduct independent oversight of all activities during the construction phase, during accident-free operations, and in response to accidents.

Noise, land use, and the quality of life. The DOE must identify, disclose, and mitigate all impacts on noise, land use, and the quality of life, including: construction noise, noise during operations; increased traffic on State and County roads; restrictions on community expansion; impacts related to splitting the Crescent Valley (and parcels and ranches within the Valley) into two parts; and degradation the overall quality of life and small town atmosphere. The mitigation program must specifically address the impacts of a severe transportation accident, resulting from such combined factors as a economic slowdown, image problems, public finance problems, natural resource damage, infrastructure damage, and numerous other impacts.

Emergency response and management. The DOE must examine, disclose, and mitigate all anticipated impacts on emergency response over the life of the proposed action. Local emergency response resources would be the first on the scene of any transportation accident involving a shipment of SNF or HLW through Eureka County. The DOE itself says (1999b), "As with any traffic accident, the local, Tribal, and State police, fire departments, and rescue squads are the first to respond to transportation accidents involving radioactive materials."

The mitigation program must address, at a minimum, impacts from the lack of local emergency response capabilities. Such mitigation must include dedicated emergency response teams that would be immediately available within a short response time to the scene of an accident. Responsibility for emergency action must not be placed on the shoulders of volunteers.

If the proposed shipments of SNF and HLW through Eureka County were to become a reality, the County would propose to establish a strike force, housed at Beowawe, funded by the project proponents, and controlled by the affected local governments. All necessary facilities would be constructed by the DOE and would become County property upon their completion. Further, the DOE must hold the County harmless from any liability associated with the facilities.

Mitigation actions must also include technical and financial assistance for all phases of emergency management, including programs, funding, and training for preparedness, response, and recovery.

The mitigation measures must be specifically designed to reduce or eliminate foreseeable hazards from the operation of the proposed rail line. They must address hazards at rail crossings, during switching, when shipments are parked on sidings, and from trail derailments.

Environmental justice. Finally, the DOE must consider, evaluate, and mitigate potential impacts on those in the Eureka County community--including children, the elderly, and low-income persons--who would be least able to avoid or adjust to the impacts of a severe accident involving a shipment of SNF or HLW through the County, and a subsequent economic downturn.

In accordance with the County's previous comments on the DEIS for the proposed repository (Eureka County, 2000), rural communities are dispersed, rather than concentrated. The DOE's risk models are based on avoiding urban areas, and presume that risks should, therefore, be borne by rural people. Rural low-income populations received damaging doses of radiation in the 1950s and 1960s from above-ground and underground nuclear weapons tests conducted by the Atomic Energy Commission. The DOE must take these disproportionately high adverse impacts of its activities into consideration.

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Part 6:

PREPARATION OF THIS REPORT

This report was prepared under a contract with the Board of Eureka County Commissioners. Abigail C. Johnson, Carson City, was the lead contractor and report coordinator.

The following subcontractors assisted with research and analysis: Robert R. Fletcher, B&C Enterprises, Las Vegas (economic impacts); Richard C. Moore, P.E., Laramie, Wyoming (description of the proposed action, environmental impacts); and Les McKenzie, HTT Resources, Spring Creek (impacts on range resources and wildlife). David S. Ziegler, AICP, Ziegler Technical, Carson City, conducted general research and compiled and edited the report. Sarah Walker, Carson City, assisted with report production.

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